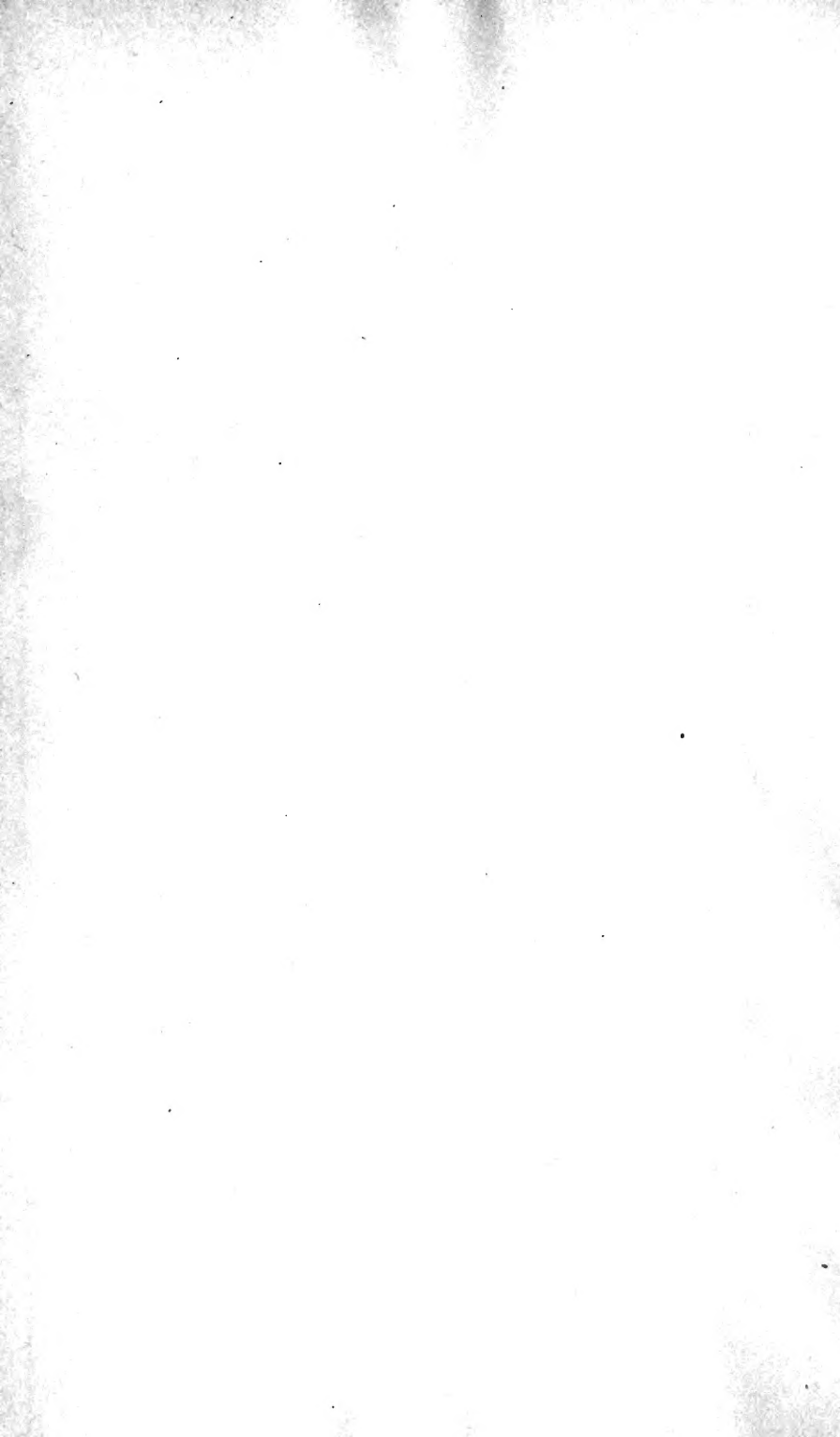






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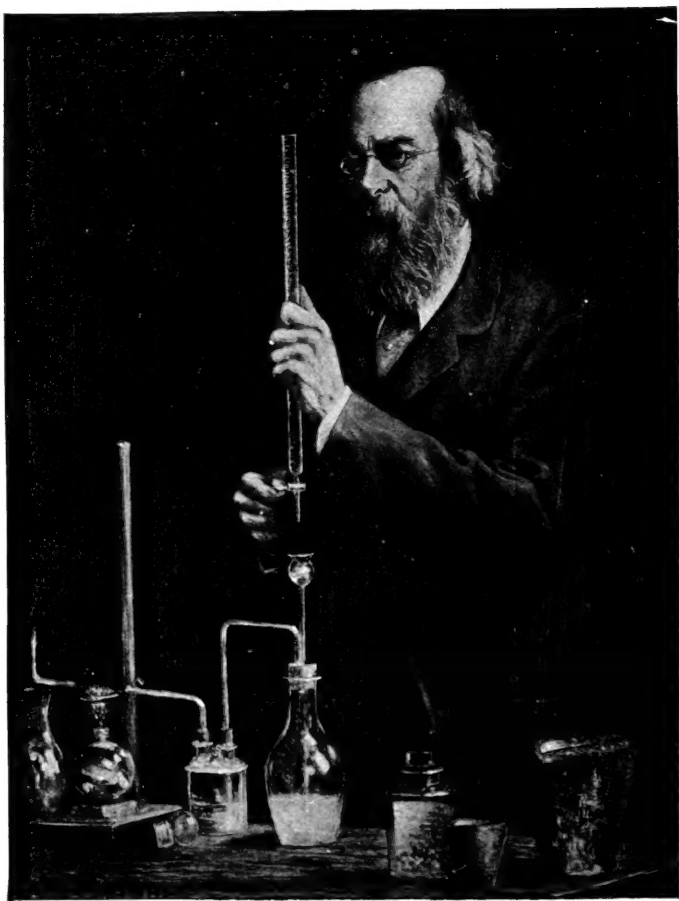
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HENRY HOLMES CROFT, D. C. L., F. C. S.
President of the Entomological Society of Ontario, 1863-4; 1868-71.

The Canadian Entomologist.

VOL. XLVIII.

LONDON, JANUARY, 1916

No. 1

PROFESSOR H. H. CROFT, D.C.L.

A most interesting memoir of the first President of the Entomological Society of Ontario, by Mr. John King, K.C., has recently been published by the Macmillan Company of Toronto.* Through the kindness of the publishers we are enabled to present to our readers an excellent portrait of one of the pioneers in Canadian Entomology, who was largely instrumental in founding the Society.

Henry Holmes Croft was born in London, England, in 1820; his first schoolmasters were French and Spanish refugees from the great Napoleonic wars, who strove to make a precarious living by teaching boys in their city of refuge. From them he passed on to Tavistock House, where he received an excellent training and the foundation of a sound education. During this period, while still a mere lad, he manifested a great taste for chemistry and carried on experiments in a small closet under the kitchen stairway in his father's house, much to the annoyance and disgust of the members of the family, who showed no appreciation of a science which seemed to produce only alarming explosions and abominable smells.

After leaving school he spent a year in the office of his father, who was Deputy Paymaster-General in the Ordnance Department, then situated in the Tower of London. With him and an elder brother he walked to the Tower and back, eight miles each way, morning and evening throughout the week, and by this means acquired vigorous health and a robust constitution which continued through life. Office work was by no means congenial, and the heart of the youth was in his little den under the stairs. By the advice of Professor Faraday, whom his father consulted, he was sent to study chemistry at the University of Berlin. He did not, however, confine his attention to this subject, but took courses of study in biology, physics, anatomy and physiology, geology and kindred sciences, and became greatly interested in entomology.

* McCaul: Croft: Forneri: Personalities of Early University Days. By John King, M.A., K.C. The Macmillan Company, St. Martin's House, Bond Street, Toronto. (Price \$1.25).

After three and a half years of steady work, he left the University with every distinction that a student could desire and returned to England in the autumn of 1841.

In the spring of the following year the University of King's College, Toronto, was being organized, the selection of a staff being placed in the hands of the Governor-General, Sir Charles Bagot. A number of eminent scientific men in England, including Professor Faraday, were consulted, and they one and all recommended in the highest terms young Croft for the chair of Chemistry and Experimental Philosophy. He was then but two and twenty years of age.

In January, 1843, Professor Croft arrived in Toronto and at once entered upon his new duties, which he discharged for thirty-six years with the utmost devotion and unqualified success.

It would be out of place to refer to the bitter controversies over University matters that raged for many years in Toronto, and in which Professor Croft took an active and influential part. The abolition of King's College and the establishment of the University of Toronto and University College are matters of Canadian history. In the former Professor Croft became Vice-Chancellor in 1849 and *ex-officio* a member of the University Senate; he was also a member of the College Council, and in both these governing bodies he was zealously interested and exercised important influence.

"In the lecture room"—to quote from the volume referred to above—"he was an admirable expositor and a happy and dexterous demonstrator. Like all good teachers of a rapidly-advancing science, he made his pupils eager for more than he gave them. In a far wider sphere than his lecture-room he, more than any other teacher in Canada, simplified and legitimately popularized chemistry, and he may be said to have laid the foundation of our educational system of practical chemistry and the admirable methods of illustration in chemical research and analysis."

He did not, however, confine his energies to the laboratory and lecture-room, but took an active interest in many organizations of public importance. He was a leading member of the local agricultural and horticultural societies, and repeatedly drew attention to the intimate relation which chemistry bears to the practical work of both departments.

In Entomology he was especially interested and formed a collection of Coleoptera of the Province, and it was through his interest in this branch of natural history that attracted the writer to him and that led to a warm friendship. My first acquaintance with him was made in 1858 at meetings of the Canadian Institute which I attended as a junior member when a student at Trinity College. Professor Croft treated me with the utmost kindness and helped and encouraged me greatly in the study of Entomology. Through him also I came to know the late Dr. William Saunders, Director of the Experimental Farms of the Dominion, who was a life-long and deeply esteemed friend.

In 1862 our devotion to the collection and study of insects arose to such a height that we thought the time had come for drawing together all those in Canada who were of similar tastes and forming a society for mutual help and encouragement. Professor Croft warmly approved of the scheme and, through his influence and that of his colleague, Professor Hincks of the Botanical Department, the Society was duly launched in the spring of 1863.

The following account is given by Mr. King in his memoir:—"Professor Croft was very honourably identified with a Society which was brought into existence chiefly through his instrumentality, and whose laudable objects are closely associated with the progress of skilled husbandry everywhere, namely, the Entomological Society of Ontario. He was the founder, or at least one of the founders, of this Society; the first meeting of its originators was held at his residence, and its present standing and widely acknowledged usefulness are largely due to his fostering care, warm advocacy, and powerful support. In disseminating information in regard to the insect pests of the agriculturist and horticulturist, as well as to insects friendly to their products, the Society has performed a work of vital service. Its admirable collections at the Centennial Exhibition at Philadelphia in 1876, comprising 86 cases filled with thousands of specimens carefully classified and named, attracted universal attention, and were far in advance of any other exhibit of the kind in the whole Exhibition. The economic worth of such collections can be estimated only by those who have given some attention to the subject; they form a groundwork upon which may be built up observations of great value, and

must have the effect of stimulating intelligent research in this important department of natural science."

"Within comparatively recent years the bounty of the Government has greatly assisted the operations of this Society. Its periodical publications, ranging over many years, contain a vast amount of original matter, recording valuable observations of a most instructive character on insects in all parts of Canada. These publications have been much sought after, both in Europe and America; some of the early numbers have been reprinted in order to meet the demand, and complete sets of the Society's works are now found in many prominent scientific libraries on both continents "

This quotation from the work of a barrister, who is not particularly interested in natural science, is highly appreciated testimony to the usefulness and value of the Society which Professor Croft was largely instrumental in founding.

Another Society which owed much in its origin and early years to the fostering care and enthusiastic support of Professor Croft, one of its founders, is the Canadian Institute of Toronto, now by warrant of His Majesty King George entitled to the prefix of *Royal*. Twice Professor Croft was elected President and for a long series of years he was a member of its Council and regular attendant at its meetings. Its periodical, "The Canadian Journal," received many contributions on chemical subjects from his pen. He was not, however, a voluminous writer, and it is much to be regretted that his stores of experience and research were not rendered available to students in a permanent form. His work on Analytical Chemistry for the use of students in Arts and Medicine was long employed as a text-book, and was an evidence of what he might have done in the field of scientific authorship, had he been so inclined.

In these days of terrible war it is interesting to know that Professor Croft took an active part in the formation of the Canadian Volunteer force, which was brought into being during the winter of 1861-62, when there seemed to be imminent danger of an armed conflict between this country and the United States in consequence of the "Trent affair." Professor Croft called a meeting of students and ex-students at the University and excited

the large gathering by a rousing speech to form an active rifle corps. He was at once elected Captain and the ranks were speedily filled. "The University Rifle Corps" was firmly established and soon attained a high degree of efficiency. Subsequently it formed a part of the famous Queen's Own Rifles of Toronto and bore a share in the engagement with the Fenians at Ridgeway in June, 1866, when three of its undergraduate members were killed and several wounded.

Years went by, each one filled with steady work and each adding to the esteem in which the Professor was held by many successive generations of students and by the public at large. At length, his health began to fail and the strong, vigorous man found that he could no longer sustain the burden of his University work, and that the time had come for his retirement. In 1879 he resigned the Professorship that he had so long and so ably filled, and removed with his family to Las Hermanitas, near San Diego, in Texas. There he spent a few pleasant years of rest and quiet and died on March 1st, 1883. Seven years later a Protestant Episcopal Church was erected in San Diego by his children and dedicated to his memory and that of their mother. At the University of Toronto his name is commemorated by the portrait in the Senate Chamber (from which our photograph is taken) and the beautiful round building now known as "The Croft Chapter House," which for many years was his laboratory and the centre of his work. In the words of his biographer, "It was there that his hundreds of students were initiated into the mysteries of his favourite science, and learned those lessons of patient enquiry and minute observation which are invaluable in the lifework of every man. Those who in times past were his pupils and found delight in his scientific investigations will not soon forget his enthusiastic zeal, his enlarged acquaintance with the literature of his department, his kindly interest in all amongst his friends and followers who manifested a regard for his favourite studies."

"He retired from his field of work with a consciousness of duty well done, and with the gratitude which is certain to follow one who, after a long term of public service, has finished a work which has been carried on with conscientious fidelity and far-reaching success."

C. J. S. BETHUNE.

POPULAR AND PRACTICAL ENTOMOLOGY.

HELIOTROPISM IN BUTTERFLIES; OR, TURNING TOWARDS THE SUN.

BY ALBERT F. WINN, WESTMOUNT, QUE.

Those who have read Dr. G. B. Longstaff's book, "Butterfly Hunting in Many Lands," have enjoyed his accounts of the peculiar habit that some species of butterflies have of carefully adjusting themselves to a certain position when they settle. Most of us will recall similar instances, such as our common Sulphur, *Colias philodice*, which is often seen in great numbers near puddles of rain water along country roads, resting with the wings closed over the back frequently leaning over at an angle of 45° to even 30° to the ground; or the Vanessas and Graptas alighting on a fence or tree trunk only to immediately shift the position of the body to one perhaps at right angles to what it had been or even exactly reversing the direction in which the head pointed. But until attention was called to it as a phenomenon of which an explanation was desired, it has been generally passed by as being an everyday occurrence, without any effort being made to try to find out *why* the insect should act so, or to keep accurate notes on exactly what the respective positions were, as well as the position of the sun, direction of the wind, temperature and nature of the object settled on.

A theory of Dr. Longstaff is, that in assuming a position inclined sideways the butterflies more easily escape detection, as the shadow is reduced to a minimum. This may be the true explanation in the case of the insects which Dr. Longstaff has seen and studied in his extensive travels, and we do not wish to imply or express the slightest doubt on his interesting conclusions, but only to call attention to a subject that has been little written about in the life-histories and habits of our Canadian butterflies, and careful observations may prove valuable as well as being interesting to the student of nature.

So far as *Colias philodice* is concerned, this *orientation*, as it is termed, was referred to in an article in one of the early volumes of this journal by Wm. Couper—"A Dissertation on Northern Butterflies" (Vol. VI, p. 92). He says: "When it alights on a flower, instead of being erect on its feet, it lies sideways, as if to receive the warmth of the sun." The same idea has been maintained by
January, 1916.

Major Tulloch, F.E.S., in regard to *Catopsilia pomona* in Hong Kong (Ent. XLVI, 205), but it would seem that neither the shortening of the shadow nor the obtaining of warmth will explain all there is to be learned. Unless my memory serves me badly, I can recall patches of roadside where *Colias philodice* had congregated in dozens, many of them resting with their wings at a decided angle, and they were not at all agreed as to the direction of the body; some had the body at right angles to the sun's rays, others with the tail towards the sun, others again intermediate. So the shadows would be all sorts of sizes and shapes, besides which it seems to require explanation how a number of shadows on a dusty or muddy road would add to the conspicuousness of these sulphur butterflies, so bright and attractive are they when they collect in little flocks, some members of which are constantly fluttering about. Of course, we can only judge this from their appearance to the human eye; what natural enemies they fear is another matter. My own observations being confined to a robber fly (*Asilidae*) catching one on the wing, and another being gobbled up by a big toad, this latter victim was leaning over, and many others within a few inches were erect. The idea of warmth being sought seems to fail in that some of the hottest days appear to be favourable for leaning over, and one flock will be found for the most part leaning over, while in another perhaps only a few feet away they will all be erect, while on cool days, though bright, none may be at an angle. It seems that a combination of circumstances is often involved, and that perhaps the brightness of the midsummer sun full face is too great and makes many of them prefer to turn their profile towards it. The direction of the wind, if strong, may also affect them to some extent, so also may the direction of the road, for many of the roads loved by the sulphur butterflies are full of ruts and ridges made by cart and carriage wheels, and a butterfly settling on such a ridge longitudinally must either stretch out the three legs on one side more than the other three or he would inevitably lean over. When resting on flowers, say thistle, their heads certainly point in all sorts of directions; but those that are feeding should be noted separately from those that are not, for an insect will do all sorts of gymnastics to get its dinner, and the same remark should apply to flocks about damp patches on the

roads, and very careful attention is necessary to see whether the tongues are in active use.

Now, let us look at the Graptas and Vanessas. Dr. Longstaff quotes the following from Parker (Mark Anniv. Vol., p. 453-469). "*Vanessa antiopa* and the Graptas settle with their wings full expanded and adjust their position so that the axis of the body is parallel to the sun's rays with head turned away from the sun."

One spring afternoon I was in a grove near Montreal and noticed many insects about a large maple tree, whose sap was flowing freely from wounds made by real estate subdivision "artists." On the western side in the sunlight were several *Vanessa antiopa* and one *Grapta progne* all settled with wings wide open, while on the shady side were a larger number of *V. antiopa* and three or four *Grapta j-album* all with their wings closed over their backs.

On another occasion, this time in August, sugared patches on my fences were attractive to butterflies. A post on the east side was in the full glare of the sun at 2 o'clock, and an *antiopa* and a *Pyrameis atalanta* kept settling on the sweetened place—curiously the *antiopa* always approached the patch from above and settled head downwards, while *atalanta* flew upwards and settled head up, and both kept the wings expanded. On the opposite side of the garden, which, of course, was in the shade, another *antiopa* settled head up and kept the wings tightly closed.

While on my holidays a couple of years ago at North Hero, Vermont, a capital chance was afforded to watch a male *Grapta comma*. It was a particularly hot, cloudless day, and the only comfortable place was in the lake, and the whole morning was spent at the beach. When we beached our boat, the butterfly was there to meet us, just fluttering a little way aside to let us pass across the beach to disrobe. After a lengthy dip, I had to wait a considerable time before my son could be persuaded that he had enough, and, for want of something better to do, I lay down in the shade of the boat and watched the butterfly, which continued to fly about, always within a radius of perhaps 10 yards, and this is what he did:—

1st—Settled on the sand, head towards the north, closed wings over back, and inclined at an angle of about 60° with the ground, the tips of wings towards the west.

2nd—Settled on sand, head towards south, held wings out flat, shifted slightly so head pointed towards southwest.

3rd—Settled head towards west, wings closed and perpendicular.

4th—Same position as No. 1, but did not orient.

5th—Settled on sand, head towards west, then shifted towards northwest, raising up body as if pitching forward, the wings closed and vertical.

6th—Settled on a log, head towards north, wings closed and vertical, remaining in full sunshine for at least 10 minutes, and was only disturbed when touched with an oar.

7th—Returned to exactly same spot on log, head northward, wings outstretched.

8th—On sand, head towards west, wings closed and slightly leaning over towards south.

9th—On the body of a small dead rock bass, head north, wings closed, then opened out flat and turned around facing south and walked to the head of fish and apparently inserted its tongue into the eye-socket of the bass.

10th—On the bow of boat, in the shade, wings closed, pointing northwest, head downward; had to be stirred up.

11th—Settled on sand, wings outstretched, head towards west.

The arrival of a large motor-boat with a cargo of very hilarious week-enders put an end to a peaceful aspect of nature, and we left *G. comma* on the shore and rowed home for our dinner.

The results of watching the habits of one single butterfly in one hour of its existence shows next to nothing as might be expected. It requires a lengthy study of the combined efforts of students of nature in many localities and different seasons and conditions to arrive at an adequate understanding of the reasons a creature has for its actions. One point worthy of mention is that in no case did it remain directly facing the sun, and incidentally also the wind which was (as is customary on Lake Champlain) south, except when on the dead bass. It may also be worth mentioning that the beach was strewn with dead fish, bass, perch and pickerel, and the sand, though dry and warm on top, was doubtless permeated with decomposed fish, and the butterfly, on settling in the sand, may have inserted the tongue down to where there was moisture of a flavour suited to its taste.

NOTES ON SMICRONYX WITH DESCRIPTIONS OF A
NEW SPECIES AND A NEW VARIETY.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA:

Among some specimens of *Smicronyx* sent me about a year ago by Ccl. Thos. L. Casey, of Washington, D. C., was one bearing the label, "*S. vestitus* Lec. from Indiana." This species was described by LeConte* from a single Kansas specimen. A comparison of Col. Casey's specimen with the type in the LeConte collection at Cambridge shows the latter to be much larger and more robust, with head, beak and thorax wholly black, elytra dull reddish; scales large, close-set and evenly distributed; thorax wider than long; elytra with distinct, coarse inclined setæ. LeConte gives its form, colour and vestiture as: "Rather robust, convex, black very densely clothed with grayish and yellowish broadly oval scales; antennæ and legs ferruginous brown." He states that the intervals are flat, each with a row of whitish hairs, and gives the length as 2.75 mm., all of which characters agree with his Kansas type. Both Col. Casey and Dr. Dietz have misinterpreted LeConte's species, as neither one had the type before him when describing the species they call *vestitus* in their papers on the genus,† and Dietz, loc. cit., p. 160, criticizes Dr. LeConte's description as "defective and misleading, as the terms 'robust' and 'prothorax densely and coarsely punctured' do not apply here, nor is any reference made to the reddish colour of the elytra."

Since the species they called *vestitus* is evidently undescribed, I have prepared the following description from the specimen sent me by Col. Casey and from others labelled "*vestitus*." by Dietz, and now in his collection at Cambridge:

***Smicronyx caseyi*, sp. nov.**

Elongate-oval, slender. Head, thorax, suture of elytra and under surface black; beak, antennæ, legs, apex of thorax and elytra except suture pale reddish-brown; above sparsely clothed with

* Proc. Am. Phil. Soc., XV, 1876, 172.† Casey, Ann. N. Y. Acad. Sci., VI, 1892, 393; Dietz, Trans. Am. Ent. Soc., XXI, 1894, 159.
January, 1916

oblong white scales, condensed on sides of thorax and in irregular patches on sides of elytra, elsewhere very unevenly scattered; under surface densely clothed with larger, rounded, concave white scales. Beak of male scarcely as long as head and thorax, feebly curved, finely striate, scaly and densely punctate on basal half, naked and more finely punctate toward apex; of female half as long as elytra, smooth, cylindrical, slightly scaly near base. Antennæ in male inserted at apical third, second joint of funicle half the length of first, scarcely longer than third; of female inserted behind the middle, second joint as long as the next two. Thorax slightly longer than wide, sides feebly rounded, disc slightly constricted near apex, rather densely and finely punctate. Elytra one-half wider and three times as long as thorax, sides parallel to apical third, then rapidly converging to a subacute apex; striæ fine, indistinctly punctate; intervals feebly convex, minutely transversely rugose, their setae almost invisible. Length 2 mm.

The range of *caseyi* (*vestitus* Casey and Dietz nec. LeConte) is given as Kansas, Dakota, Colorado and Montana, and it is possible that the specimen donated by Casey is as wrongly labeled as to locality as it is to name. Named in honor of Col. T. L. Casey.

The species recognized by Dietz and in part by Casey as the *Smicronyx corniculatus* of Fahrræus,† the type of which was from Pennsylvania, agrees fairly well with the original description except in the colour of the elytra, which was given as "nigra, griseo-tomentosa, fusco-nebulosa." As with many other North American species described in Schonherr's work, the types of which are now in Stockholm and therefore difficult of access, there has been much difference of opinion as to what form Fahrræus had in hand. In the Cambridge collection are two species placed side by side, each bearing the label "*corniculatus* Fahr." in LeConte's writing. One of these is what we now know as *sculpticollis*, the other as *apionides*, both described by Casey. It was probably from the former that LeConte drew up the description (1876, 173) in which he gave the colour as "dark brown, not very densely clothed with narrow small whitish and yellowish scales," and the thorax as "much

† Schon. Gén. et Spec. Curc., VII, Pt. II, 1843, 309.

rounded on the sides." Casey (1892, 391) combined LeConte's *squamulatus* with the *corniculatus* as recognized by Dietz and his description is a composite of the two. Dietz (1894, 164) described a form as *corniculatus*, and then mentions four varieties. These, as lettered in his collection at Cambridge, appear to be *a*, a small form of his *nebulosus*; *c*, the same as described by him as *corniculatus*; *b*, and *d*, the *squamulatus* of LeConte, of which Dietz's *columbianus* is a synonym. Until the type of Fahræus is studied by some American Coleopterist familiar with our species of *Smicronyx*, the name *corniculatus* may, as well as any other, be ascribed to the form so recognized by Dietz.

A study of the type of *S. lanuginosus* Dietz in the Horn collection shows it to be a dwarf form (2 mm.) of *corniculatus* with the "conspicuous long, hair-like setæ" mentioned by Dietz visible only when viewed in profile, and then scarcely if any more obvious than those of *corniculatus* when similarly viewed. I consider it scarcely worthy a varietal name.

As mentioned above, *Smicronyx squamulatus* LeConte (1876, 173) was treated by Casey as a synonym of *corniculatus*, which it closely resembles, but differs in the maculate elytra, paler antennæ and distinct setæ of both thorax and elytra. Dietz (1894, 177) mentions it as unknown to him, but "probably a variety of *corniculatus*." His types show, however, that he had described it (1894, 162) as *S. columbianus*, and also (p. 165) as varieties *b* and *d* of *corniculatus*.

***Smicronyx quadrifer texana*, var. nov.**

Differs from *quadrifer* Casey in having the scales of upper surface mostly pale brown, the lateral stripes of thorax obsolete on apical third, the median one reaching only to basal third; elytral dark spot beginning at basal fourth instead of basal sixth, with a white line running from its front margin to base along the third intervals; each interval with a row of large, white, inclined scale-like setæ, these absent on the median black spot.

One specimen from Brownsville, Texas; May 25.

NEW LIFE HISTORIES AND NOTES IN PAPAIPEMA SM.
(LEPIDOPTERA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XLVII, p. 151).

Papaipema nelita Strk.

A recent examination of Strecker's type reaffirms our early determination of this species which was made from scanty material, and we can report the larvæ were found at favourable stations in the environs of Chicago, the type locality, in July of the current year. Its association was with the previously recorded food-plant, *Rudbeckia laciniata* L., so far the only known choice. Our larval note in this magazine, Vol. XXXIX, p. 313, where it is assumed from the penultimate stage the young larvæ belong the group showing a continuous dorsal line, needs correction. A summary for stages III, IV, V may reflect, viz.:

These instars correspond to the normal features of the group; head polished, darkened at ocelli, but without the prominent side line; tubercles not large, blackish, IVa does not appear on joint ten; the white dorsal and subdorsal lines are broken at the middle, where the mahogany brown body colour prevails as an encircling ring on the posterior portion of joint three, on four, five, six and seven, becoming paler with each molt; lengths, 15, 18, 21 mm.; May 20-June 15, Chicago (larvæ per A. Kwiat).

At Wilmington, Del., Mr F. M. Jones has encountered *nelita* at various stations, and his rearings of the moth show a small percentage which have the stigmata white marked, in contradistinction to the type form. If such happen to be of well-developed size, a superficial likeness is very strong with the white marked *P. frigida* var. *thalictri* Lyman, in instances of small specimens of that form. Under an adverse criticism, which would countenance no difference between these truly similar moths, all niceties of larval differentiation and departures of male structures would be swept away. So it appears best to give permanent attention to this departure with the Strecker species, characterizing it as variety *linda*.

January, 1916

Papaipema nelita linda, new variety.

Typical in the greyish brown ground colour, with golden brown irroration medially, the purplish basal and postmedial areas; also in maculation; basal spots vague, not white marked, the orbicular and claviform are two rounded white spots, the reniform is a collection of dots around a central curved line, the outermost opposite the cell yellow, the rest usually white; ordinarily the conventional pattern for the white markings except the reniform is proportionately a little short. Expanse 36 mm.

A male type is with the author, a paratype with Mr Jones, and a specimen was forwarded to the British Museum for comparison with the type of *P. limpida* Gn. from which it is reported to be distinct by Sir Geo. F. Hampson. This new variety is dedicated to Mrs. F. M. Jones, whose efforts in behalf of entomological research warrant much more than this slight recognition.

Papaipema cerina Grt.

The apprehension of this larva is due to the efforts of Mr. Chas. Rummel of Newark, N. J., who encounters it occasionally in his locality. We were indebted to his liberality for early staged larvæ the current season, as well as for the privilege of bringing out this note. That this well-known eastern species had escaped larval notice seems due in part to its close resemblance to *P. cataphracta*, that its seemingly preferred food-plant, *Lilium superbum* L., is very generally bored also by the latter, and while it appears certain other plants than *Lilium* are involved, the similarity to this prototype, whose individuality was considered unique, has allowed it to escape notice. Thus in future generic groupings, the species should be associated with *cataphracta* and *duovata*, a position not assigned it heretofore and which is of some import since on "first species" rule it became Smith's type of the genus.

The larval habit doubtless follows the usual course, the overwintering egg hatching the last week of May. Larval stages IV and V are identical with *cataphracta* except that they are a fortnight in advance of the latter. Characteristics are fully typical, tubercles not large; colour livid purple-brown on which the white dorsal and subdorsal lines are contrastingly drawn without break.

Penultimate stage: Paler and more pinkish, the lines yellowish; tubercle 1 on joints four, five and six the same as on other joints, whereas the ally has them enlarged at this point.

Maturity: Head and plates typical; colour yellowish translucent, with lines entirely obliterated; tubercles mostly minute, I and II, except on twelve are only discernable as the merest dots under a lens, IV alone retains its usual size, and in comparison to microscopic I, II, III and IIIa, seems proportionately large, though it does not exceed the spiracle, on joint ten IVa shows same size as IV, a trifle high, but of similar prominence in bearing seta; length 42 mm.; leaves plant for pupation July 31.

The pupa shows no departure from the usual form, and is less cylindrical than its ally, which normally changes in its gallery and is effected by the confined quarters. Emergence data are not at hand, but from that of flown specimens must centre around the first ten days of September, whereas the near congener is a month later.

***Papaipema nepheleptena* Dyar.**

A recent re-examination of the unique type of this species, coupled with the wider acquaintance by the more extended breeding of *P. mæseri* Bird, (1911) furnishes conviction there is but one species involved, and that the Dyar name has precedence, being proposed in 1908. The type, a flown and rather worn specimen, is from New York, and regrets over our error of determination are now tempered by the establishment of the larval history for this local but heretofore elusive *nepheleptena*. Thus it will appear our larval notes for the Turtle-head borer, Can. Ent., Vol. XLV, p. 120, are to be associated with the latter name. A brief addenda to these may be made for:

Stage I—Cephalic and anal shields well developed, also the the setæ; the first four abdominal segments show as a dark girdle, the extremities semi-translucent.

Stage II—Head is without side line, nor is its continuation on the lower edge of shield yet manifest; the dark girdle not crossed by the white longitudinal lines; tubercles concolorous.

Stage III—Similar, with the generic features now well evident; the dorsal line alone crosses the girdle, showing as the merest white

thread; tubercle IVa on joint ten seems always absent in this species, ten larval preparations at least have it unindicated; lengths, 2.5, 6.5, 11 mm.; May 25-June 18; Buffalo, N. Y. (larvæ per H. Baumann).

Papaipema circumlucens Smith.

When the late Dr. J. B. Smith advanced this specific name at the "Revision of Hydroecia," 1899, Trans. Am. Ent. Soc., Vol. XXVI, the knowledge of larval stages was not of avail, and the material for study scanty, and of inferior quality for the most part. Though his efforts for fullness were well directed, and the co-operation of museums and collectors very general, a misconception in regard to the individuality of *circumlucens* has been recognized for some time, in that more than one species was associated among his types. The writer had arrived at a conclusion as to what form Dr. Smith intended his name should apply, but it was not until 1914 that the larval history became positively known in the particular instance it was necessary to cite. Of his "types" and "co-types" we have recently had the advantage of comparing those in the U. S. National Museum, the Barnes and Rutgers collection, while a female co-type was in the possession of the writer. Three species are found to be involved—the Hop-stem borer, one whose chief foodplant is Dogbane; the true *circumlucens*, and *ochropenta* Dyar, a western species with the larva unknown. The Hop-stem borer has already been differentiated as *P. humuli* Bird, Can. Ent., Vol. XLVII, p. 113. We herewith restrict the type of *circumlucens* Smith to the female type specimen of the United States National Museum, which was without doubt a feeder in *Apocynum*, Dogbane, in its larval state, and for the following reasons. Of the six "types" or "co-types," this form predominates; in our own collection a perfect specimen of the Hop-stem borer was labeled merely "*circumlucens*," while a much-worn Dogbane feeder was ticketed "*circumlucens* Sm. female co-type"; *ochropenta* occurs in but one specimen. The other male "type" Washington is *humuli*.

It is needless to add that from the conventional pattern in the group and the nearness of coloration of the forms involved, the oversight at the time of commission is easily understood.

Regarding the life-history, Mr. A. F. Winn, of Montreal, was the first to call our attention to the fact that *Apocynum* was bored by some *Papaipema*, but his observations were made after the larval period, and were without further or specific verification. Several seasons later, in 1914, Messrs. A. Kwiat and E. Beer at Chicago discovered *Apocynum androsæmifolium* L. to be profusely bored there, and kindly forwarded larvæ which seemed different from any previously seen. At emergence there was surprise that the browner and larger specimens matched our co-type of *circumlucens*, while the smaller, yellower ones ran indistinguishably to *baptisiæ* Bird.

The current year the writer had advantage of personal studies of the prairie flora in the vicinity of Chicago, under direction of the local entomologists, and observed *circumlucens* extensively at work. The larva is a gross feeder, tunnelling out the lower stem and a considerable portion of the running rootstock when possible. By the middle of July the wilted or browned foliage is very noticeable, and it becomes one of the easiest species to apprehend. Pupation occurs in the burrow and emergence by the orifice, which has served for frass disposal, and without its further enlargement. A network of silk and fragments chewed from the woody stem encloses the gallery directly above the pupa, through which the moth easily breaks, but such details are somewhat dependent on the kind of food-plant occupied. As is usual where a species is super-abundant, dispersal to other plants may be noticed, and in *Mesadenia tuberosa* Nutt. (E. Beer) frequently, and in *Vernonia fasciculata* Michx. (A. Kwiat) rarely, larvæ were found at work, the former being apparently a true alternative food-plant. Quite a noticeable difference exists superficially between the *Apocynum* larva and that boring *Baptisia inctoria* L. productive of *P. baptisiæ* Bird, Can. Ent., Vol. XXXIV, p. 109, but the moths intergrade so completely there seems no warrant for the retention of this name even in a varietal sense. Hence *P. baptisiæ* Bird, 1902, falls to *P. circumlucens*, Smith 1899.

The typical, *Apocynum* feeding larva is larger, more cylindric and pink than that we had characterized from *Baptisia*, but it is believed to be due to food-plant conditions entirely. The principal larval features are generically normal.

Stage V—Head without side line, colour dull pink, lines yellowish, the dorsal narrow and alone continuous; tubercles appear dim from being nearly concolorous, IV most prominent, and IVa always defined on joint ten.

Stage VI—Very cylindric, paler, otherwise no change.

Stage VII—Now more robust, tubercles conspicuous by reason of the semi-translucence; IVa has continued on ten, but has never equalled IV. Length, 33, 39, 43 mm. July 15-Aug. 12.

A chief parasite with the species is a *Tachina* fly, to which attention has been previously called with other species, as being a general check in the genus. Our reference to it as *Ceromasia myoidæa* we learn through the kindness of Dr. C. H. T. Townsend is in need of revision, and on this occasion we may deal with yet another correction. Our understanding of the matter is that the above name refers to a European, or an assumed cosmopolitan insect, but inferentially we would not expect such to be critically involved in the economy of a large American genus, a genus so thoroughly American that a selection of widely differing food-plants in many cases exists with plant genera found only in America. From our limited knowledge of the life history, it appears this fly may be associated only with *Papaipema*, or such similar boring larvæ as flourish at about the same date. Over-wintering puparia do not give up imagoes until July, when the borers are of sufficient size to answer their purpose. There appears to be two broods of the flies, though it may be that those over-wintering are merely tardy larvæ in pupating, or possibly to having an unusually large food supply. A fortnight's difference in pupation seems sufficient to cause the later ones to overwinter. Ovi- or larviposition may be merely within the gallery opening, there being opportunity for attachment to the host, as it has frequently to come to the orifice to dispose of frass. Some of the *Ichneumonidæ* have been encountered 20 cm. down in these galleries, but on such occasions it was the pupa which was sought. While the fly larvæ must subsist internally, when about mature they may be found outside the decaying shrunken host from which they move a slight distance to pupate. The pupa is cylindric, with ends rounded, unattached and unprotected in the gallery, colour brown.

This fly is now to be known as *Andrina radialis* Townsend.

Dr. Townsend has been good enough to prepare a characterization which is appended, over his signature.

***Andrina radialis* Townsend, new name.**

Andrina radialis Townsend, new name for *Masicera myoidæa* Coquillett, 1897, Rev. Tach. 114 (nec. *Lydella myoidæa* RD., 1830, Myod. 114)—Holotype labeled by Coquillett as above, loc. District of Columbia, May 16, 1882 (Coll. C. V. Riley).

Holotype, No. 19601 U. S. N. M., female. Allotype, male, Rye N. Y. (H. Bird). Paratypes include six specimens reared by Mr. Bird from several lepidopterous larvæ boring the roots of plants underground; numerous specimens reared by the Bureau of Entomology from several hosts; specimen reared by Mr. W. R. Walton from *Nonagria oblonga* at Harrisburg, Pa.; and TD4468, female, Beverly, Mass., July 1, 1875 (Edward Burgess). The last was relaxed and dissected, being the only specimen available that had been collected, not reared. It was found to contain several hundred eggs and maggots. The egg is elongate and bowed. The maggot is without hairs, but with spine-rows encircling the body.

The species differs from *Andrina* (*Paraphorocera* BB. syn.) *senilis* Meigen as follows:—Arista thickened on only basal half; third antennal joint of male sharply angular on upper apical corner, that of female less so; male vertex about equal to eye-width, that of female but little broader; frontal bristles not descending lower than base of arista; face less receding, the vibrissal axis of head nearly three-fourths of antennal axis; microscopic hairs of facialia do not extend one-third way up in male, and less than one-fourth way in female; eyes faintly and thinly hairy. The cheeks are from little over to less than one-fourth eye-height. The species may stand as type of subgenus B of *Andrina*.

Two specimens from England, labeled by Brunetti *Masicera myoidæa*, are apparently *senilis* Meigen (*tincta* BB. syn.). The front and cheeks are much broader in *senilis* than in *radialis*. The female from England was relaxed and dissected, and found to contain the same eggs and maggots in a rather long coiled uterus (TD4469).—CHARLES H. T. TOWNSEND.

TWO NEW CANADIAN DIPTERA.

BY J. M. ALDRICH, ASST. IN CEREAL AND FORAGE INSECT INVESTIGATIONS, U. S. BUREAU OF ENTOMOLOGY.*

Exorista caesar, n. sp.

A black and silvery species with black palpi; runs to couplet 5 in Coquillett's Revision, p. 93, but does not have the characters of either alternative of the couplet.

Male—Width of front at narrowest compared with entire width of head gives for 8 males the decimals .263; .308; .233; .271; .263; .254; .268; .300—average, .270. These are micrometer measurements. Ocellars normal, proclinate; frontals 10, rather slender, reaching to the level of the arista; the uppermost stouter and rather far before the vertical; frontal stripe blackish, satiny, wider than either parafacial, the latter subshining above, with erect fine hairs which extend down below the anterior frontals a little; these hairs are most striking above, across the ocellar region; antennæ black, third joint four times as long as the second, extending almost to oral margin; arista thickened about 2-5 its length; parafacials narrow, silvery, bare; vibrissæ at oral margin, above them a short dense row of small bristles extending hardly $\frac{1}{4}$ of the way to insertion of antennæ (less in female); bucca about 1-6 the eye-height; palpi black; eyes densely hairy; proboscis short and retracted.

Mesonotum lightly cinereous between the rows of bristles, which are on shining intervals; sides from humeri back more silvery pollinose; dorsocentrals 4 behind, 3 before the suture; inner dc 3 and 3; scutellum with 3 marginal pairs and a small, nearly horizontal apical pair, also numerous long, erect hairs; sternopleurals 3; pleuræ cinereous pollinose; calypters pure white.

Abdomen shining black, anterior half of each segment silvery pollinose, which is not sharply limited and leaves an indefinite median black stripe; first segment with a pair of strong median marginals; second with one or more pairs of discals, a pair of median marginals and a pair of laterals; third segment with one or more pairs of discals, and a marginal row of 10; hairs of abdomen long and erect, more so toward tip.

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Legs entirely black, the brown pulvilli as long as the last tarsal joint on all the feet; middle tibia with one long spine below its middle on outer front side, and usually a small one above it; hind tibia with slightly uneven row of small bristles on outer hind side, one below middle being larger.

Wings almost hyaline; third vein with one or two hairs at base; fourth vein with rounded, oblique curve; apical cell open some distance before wing tip (more than half the distance separating tips of second and third); hind cross-vein rather oblique and bowed outwardly. Apical cross-vein parallel with hind margin.

Female—Front at narrowest compared with entire width of head gives in 5 specimens .360; .345; .327; .303; .322—average, .331. Parafrontals wider than stripe; third antennal joint about three times as long as second; above vibrissæ only a few small hairs; pulvilli short. Hairs of head, scutellum and abdomen not so long and erect as in male; middle tibia with two spines on outer front side.

Length 4.7 to 6.3 mm.

Described from nine males and five females, reared by Prof Lawson Cæsar from *Archips argyrospila* at Simcoe, Ont.; dates of emergence, July 1 to 15, 1915.

I dedicate the species to Mr. Cæsar, and follow the example of Linnæus (in *Lucilia cæsar*) in leaving the specific name in apposition in the nominative case, instead of giving it a genitive ending.

Two specimens of each sex, including the type male, will be deposited in the Canadian National Museum; the remainder will be at the disposal of Mr. Cæsar.

***Frontina spectabilis*, n. sp.**

Female—Easily recognized by a dense coating of golden pollen, which uniformly covers the upper portions of head, thorax and abdomen, except that it is less distinct on the first abdominal segment.

Front of vertex, when viewed from above, as wide as one eye (.333 of entire head by micrometer measurement); ocellars and orbitals normal, proclinate; the frontals form a row of 7 (not

counting the vertical), which extend to the base of the third antennal joint; frontal stripe half as wide as parafrontal, reddish brown; parafrontal with a few small hairs; first and second antennal joints red, the third black, four times as long as second, reaching almost to oral margin, the arista with short penultimate joint, the last thickened almost to middle; parafacials silvery, more yellow above, bare, less than half as wide as the facial depression; facial ridged with a row of 7 coarse bristles, ascending above middle; vibrissæ at oral margin; palpi yellow, rather stout; eyes bare, bucca about one-fifth the eye-height.

Thorax with the pollen gradually becoming cinereous on the sides; dorsocentrals 4 postsutural, 3 presutural; inner dorsocentrals 3 and 3, one pair being just before the suture; scutellum with 3 marginal pairs and a small nearly horizontal apical pair; sternopleurals 3; calypters pale yellow.

Abdomen with pollen changing to gray well down on sides; the specimen shows no adaptations for depositing eggs or larvæ; second segment with a pair of median marginal bristles; third with a marginal row of 8, and some coarse hairs in the place of a discal pair; fourth with a row of 8 on the middle and a few irregular smaller ones at hind margin.

Legs black, middle tibia with one spine on outer front side below middle; hind tibia on outer side behind with an uneven row of small bristles, two near the middle being larger.

Wings hyaline, veins yellow on basal half; first posterior cell open rather near apex, as far from it as one-third the distance separating tips of second and third veins; third vein with 2 or three hairs at base; fourth vein with angle rather abruptly rounded, not appendiculate; hind cross-vein sinuous, nearer to bend than to anterior cross-vein.

Length 7 mm.; of wing, 6 mm.

One female, Wabamic, Ontario, collected by H. S. Parrish, Aug. 5, 1915; deposited in the Canadian National Museum.

I see no difficulty about referring the species to this genus, aside from the fact that the "cilia," or exterior row of bristles, on the hind tibia, are somewhat coarse and uneven.

NOTES ON CHRYSOTIMUS WITH THE DESCRIPTION OF
A NEW SPECIES (DIPTERA).

BY M. C. VAN DUZEE, BUFFALO, N. Y.

I took two of these little flies in Northern Ontario, one at Kearney and the other at Brulé Lake on the first and second of August, 1911. They are both males, and are no doubt the male of Loew's *Chrysotimus delicatus*, agreeing with his description in having the antennæ black, palpi yellow, and the posterior cross-vein before the middle of the wing.

It seems to me that the males described by Prof. Wheeler (Psyche Vol. V, p. 375) as the male of *C. pusio* Loew should have been considered a distinct species, as both males and females that he took in Wisconsin had the first two antennal joints yellow, the third brown as is the case in *C. concinnus* Zett, an European species, but it is not likely that it is that species, as in *concinnus* the cross-vein is before the middle of the fifth vein, while in Wheeler's specimens it is at or beyond the middle, if it answers Loew's description of *pusio* as he states,. I have not seen Wheeler's material and therefore cannot be sure that his specimens represent a new species.

The males of this genus have the abdomen metallic green, while that of the female is mostly yellow. The hypopygium is conspicuous but scarcely bent under the abdomen; in all three species that I have seen it has a small, hairy, black appendage near the centre of the posterior edge

The males of *delicatus* Loew that I took in Canada have the abdomen and thorax bright metallic green with coppery reflections and thin grayish pollen; the hypopygium brown, conspicuous but imbedded, forming a rounded tip to the abdomen, which projects in a point slightly below the venter.

I took one male and three females at Colden, Erie Co., N. Y., Aug. 9th, 1914, which are no doubt the true *C. pusio* Loew. They have black antennæ and brown palpi; the cross-vein is in the middle of the fifth vein as in the male of *delicatus* Loew, but appears a

little nearer the tip of the wing, as the wing seems somewhat shorter. (This character is of little value in separating the species, as the difference is so slight that it would not be noticed without comparing the two). The male hypopygium is rather large and somewhat bent forward, projecting nearly half its length below the venter of the abdomen.

I have received from Prof. J. M. Aldrich a male which evidently represents another species. I do not think it can be the same as the males Wheeler had. The following is a description of this species:—

***Chrysotimus flavicornis*, n. sp.**

Male—Length 1.75 mm. Face and front green with white pollen, which does not conceal the ground colour; ocellar tubercle blackish; palpi brown; antennæ yellow (third joint missing in the type). Thorax pale green with bright coppery reflections and thickly covered with grayish white pollen; prescutellar depression sharply defined; pleuræ black with grayish pollen. Abdomen green with slightly coppery reflections and dulled with gray pollen; hairs and bristles of the thorax and abdomen yellow; hypopygium short, yellowish brown with a black appendage covered with rather long black hairs at the centre of the posterior side; venter yellow. Coxæ and legs yellow. Tegulæ, their cilia and the halteres yellow. Wings tinged with yellow; costa and veins yellow; third and fourth veins parallel beyond the cross-vein; apex of wing equidistant from the tips of the third and fourth veins; posterior cross-vein a little beyond the middle of the fifth vein.

Described from one male taken at Richmond Hill, L. I., N. Y., July 5th, by Mr Daecke. Type in the collection of Prof. J. M. Aldrich.

The yellow antennæ and thick pollen of the thorax and abdomen separate this form the two preceding species. It differs from Prof. Wheeler's description of the supposed male of *C. pusio* Loew in lacking the vivid green of the thorax and pleuræ, the green of the dorsum of the thorax in this species being pale and scarcely shining, and the pleuræ being black.

NOTES ON TYPES OF LEPIDOPTERA IN SNOW COLLECTION.

BY J. MCDUNNOUGH, PH.D., DECATUR, ILL.

Through the courtesy of Prof. S.J. Hunter, I recently had the opportunity of examining the types of Lepidop era contained in the Snow Collection at Lawrence, Kansas, and comparing with them specimens taken with me for that purpose. A list of these types is published in the Kansas Univ. Sci. Bull., Vol. VIII (1), 1913, p. 28, and it is with the purpose of correcting a few errors that have been introduced into this paper as well as offering some synonymic notes on several of the species that I have undertaken this article.

The types themselves either bear a large printed label "type" or a label "type specimen, discovered by F. H. Snow," with the locality and a red disk pinned below, but unfortunately, with but few exceptions, the actual name of the species is not attached to the specimen, but pinned alongside, as was formerly the case with Walker's types in the British Museum. Up to the present no great harm has been done as the collection remains as arranged by Prof. Snow, but one can readily see what might happen if an energetic but unscientific student were set to rearranging the collection; the few exceptions noted above are mostly in the Geometridæ and Pyralidæ, a number of which bear Grote's written type label.

In the *Noctuidæ* most of the types are those of species described by Grote from material collected by Prof. Snow in Idaho Springs, Colo., and near Las Vegas Hot Springs, New Mexico, and types of nearly all of these species are stated by Hampson to be in the British Museum and bear Grote's actual type label as I have personally verified. It would seem that whenever Grote received several specimens of one species he retained at least one to which a type label was affixed, but in the case of a unique this was returned to Prof. Snow. In view of this fact, it would be well in my estimation to restrict the type to the British Museum specimen wherever we find types stated to be in both collections, and fortunately this will lead to no confusion, as in every such instance the species represented by the two types is undoubtedly a single one. In January, 1916.

cases where Prof. Smith in his Catalogue of Noctuidæ gives the types as being in the Snow and Neumœgen collections, we think that the Snow Collection should have the preference, Prof. Snow being the original collector. Concerning several species as given in Hunter's list, the following notes may be of value:—

Noctuidæ.

Hadena burgessi Morr.

This is not the type of *burgessi* Morr., but of *discors* Grt., described from Idaho Springs, Colo., in Proc. Kan. Acad. Sci. VII, 64; Prof. Snow had evidently rearranged the collection according to Smith's Check List, in which *discors* Grt. is made a synonym of *burgessi* Morr., for the name *burgessi* Morr. stands alongside a series of three specimens, two of which are true *burgessi* from the East, and the third specimen bears the label "Idaho Spgs., Colo." and the red disk beneath, and is without doubt the type of *discors*, agreeing with the original description in every particular. The species, *discors*, is however *not* a synonym of *burgessi* Morr., and is not even an *Hadena*, but belongs in the genus *Anytus*, with spined hind tibiæ, and will take priority over *vinela* Sm., described from Denver and Glenwood Spgs., Colo. We would call particular attention to the fact that the original description of *discors* Grt. distinctly states that the hind wings have a "black, distinct, incompletely-broken terminal line," and the thorax has "a fine line or collar and tegulæ lined with black," which does not apply to *burgessi* Morr.; various other points in the description of the primaries cannot apply to *burgessi* Morr., but do most distinctly apply to the Colorado *Anytus*.

Oncocnemis major Grt.

Under this name is a specimen bearing the label *Oncocnemis curvicollis* Grt. with red type disk, from Arizona; this may be one of the three originals from which the description was drawn up, but Smith states that the types of *curvicollis* are in the National Museum, Neumœgen and Graef Collections; the matter will bear further investigation. The type of *major* Grt. is in the British Museum.

Chorizagrotis terrealis Grt.

The ♂ type with Grote's handwritten type label affixed is in the collection; we have not been able to match it; Hampson's figure from a drawing of a so-called "type" in the Neumögen collection is poor and too contrasted; according to our notes the species is a dark indeterminate form with basal dash and slight dark shading between the usual spots; the s. t. line is almost obsolete.

Euxoa verticalis Grt.

The specimen in the collection cannot be considered a type, as it bears the label "Hot Springs, New Mex.," whereas the type locality is Idaho Spgs., Colo.; it is, however, typical. The same remarks would apply to *Richia parentalis* Grt. and *decipiens* Grt.; the true types of all three species are in the British Museum.

Geometridæ.**Emplœcia inconstans** Geyer.

Under this heading is included the type specimen of *cephisaria* Grt.; the type of *inconstans* Geyer has, of course, long been lost, and the error is due to Prof. Snow's peculiar system of labelling.

Deilinia perpallidaria Grt.

This cannot be considered the type, which was a ♂ specimen from New Mexico (Snow), whereas the specimen in the Snow Collection, bearing a written label "*Thamnonoma perpallidaria*, n. sp.," is from Idaho Spgs., Colo., and a ♀; besides this, it does not agree with Grote's description, and is a *Macaria* species, I think. Where the true type is I do not know.

Lychnosea helveolaria Hulst.

The type under this heading is that of *aulularia* Grt., which seems correctly placed as a synonym of *helveolaria*.

Hyperitis indiscretata Hy. Edw.

The ♀ type of this species, labelled "*Tetracis indiscretata*, type" by Hy. Edwards himself, proves to be a *Sabulodes* and the same species as that described by Strecker as *Melanema canusaria* from a single ♂, *indiscretata* taking priority over Strecker's name.

The species is allied to *arcasaria* Wlk., but the apical dark triangle at costal end of t. p. line is much narrower and the t. p. line is almost rigidly oblique; the ♂'s are considerably browner in colour than the ♀'s, which tend towards yellowish.

Sabulodes imitata Hy. Edw.

The ♀ type bears Hy. Edward's hand-written label, "*Antepione imitata*, type." It is closely related to the preceding species, but still more closely to *arcasaria* Wlk., the apical triangle being intermediate in width between *arcasaria* and *indiscretata* and the t. p. line bent as in the former species. *Costinotata* Tayl., judging by the ♂ and ♀ cotypes from Prescott, Ariz. (not 2 ♀'s from Phoenix, Ariz., as stated in original description, *vide* Can. Ent. XLIV, 275, 1912), becomes a synonym of this species.

Pyralidæ.

Elophila avernalis Grt.

The type specimen bears Grote's written type label; this has been placed by Dr. Dyar in his revision of the Nymphulidæ as *Ab. a* of *fulicalis* Clem. It turns out to be abundantly distinct and the same species as that described by ourselves as *Argyractis confusalis* (1913 Cont. N. Hist. N. Am. Lep. II (3) 133, Pl. VIII, fig. 11), which thus becomes a synonym. The species was described from two specimens, so that the *two* cotypes (ex Coll. Fernald) from Hot Springs, Arizona (? New Mexico) which Dr. Dyar had before him at the time of the revision are probably spurious; one at least must be, which possibly accounts for *avernalis* being associated with *fulicalis*. We have a long series from New Mexico and Arizona, and find the species very constant.

King Ferdinand of Bulgaria, has been removed from the membership in the Entomological Society of France, which he has held since 1882. His name has also been erased from the membership list of the Petrograd Entomological Society. In this society there has been elected in his place M. Lameere, of Brussels, who is now working in the Paris Museum of Natural History.—*Science*.

NEW GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

Below are given descriptions of a miscellaneous lot of gall midges showing a varied food habit and originating in widely separated portions of the world.

***Dasyneura sassafra*, n. sp.**

The midge described below was reared by W. A. Ross, August 12, 1915, from larvæ curling sassafras foliage at Gordon, Ont., and submitted for identification by Arthur Gibson, Chief Assistant Entomologist of the Department of Agriculture, Ottawa, Can. The species runs in our key to *D. apicata* Felt, noticed in detail on page 152 of New York State Museum Bulletin 175. It is easily separated from this form and also the somewhat similar *Dasyneura smilacifolia* Felt by structural and colorational characters.

Female—Length .75 mm. Antennæ extending to the second abdominal segment, sparsely haired dark brown; 16 sessile segments, the fifth with a length two and one-half times its diameter, the terminal segment compound, with a length four to five times its diameter and a more or less distinct constriction near the middle. Palpi; first segment subquadrate, irregular, the second with a length more than twice its diameter, the third a little longer than the second, more slender, the fourth one-half longer than the third, more slender. Mesonotum light yellowish brown, the submedian lines and scutellum yellowish, postscutellum reddish yellow. Abdomen sparsely haired, pale yellowish. Wings hyaline; halteres pale yellowish. Coxæ and femora mostly pale yellowish, the distal portion of femora, tibiæ and tarsi dark brown, the tarsi almost black; claws slender, strongly curved, the pulvilli nearly as long as the claws. Ovipositor pale yellowish, fuscous apically, as long as the abdomen, the terminal lobes with a length nearly four times the width, broadly rounded and sparsely setose apically. Type Cecid. a2676.

***Dasyneura gossypii*, n. sp.**

The small midges described below were forwarded under date of July 7, 1915, by Prof. T. Bainbrigge Fletcher, Imperial Entomologist of the Agricultural Research Institute, Pusa, Bihar,

India. Both sexes are figured on page 363 of his work on South Indian Insects and the species is considered by him as of minor importance. He states that the insect is locally known as the cotton flower bud maggot and the larvæ are recorded as inhabiting cotton buds, causing them to burst and drop. Pupation occurs in the withering buds.

Female—Length .75 mm. Antennæ extending nearly to the base of the abdomen, sparsely haired, pale yellowish, yellowish basally; 12 sessile segments, the fifth with a length about two and one-half times its diameter; terminal segment somewhat produced, with a length three times its diameter and tapering to a broadly rounded apex. Palpi: first segment subquadrate, the second twice the length of the first, more slender, the third three times the length of the second, somewhat dilated, the fourth about three-fourths the length of the third, more slender. Head yellowish, eyes black. Mesonotum pale yellowish brown. Scutellum and postscutellum yellowish. Abdomen yellowish brown, tapering. Wings hyaline; halteres, coxæ, femora and most of the tibiæ whitish transparent, the tarsi mostly pale yellowish, the pulvilli as long as the slender, strongly curved claws. Ovipositor with a length nearly equal to the body, the terminal lobes slender, with a length about four times the width. Type Cecid. a2678.

Walshomyia texana, n. sp.

The midges described below were reared by Mrs. L. T. Binkley, Instructor in Zoology, State University, Austin, Texas, from a bud gall on the wild Texas or Mountain Cedar (*Sabina sabinoides*). The species is quite distinct from *W. juniperina* Felt, reared from the fruit of *Juniperus californica*, and while it presents some differences from the generic type, we believe that it should be referred to this genus.

Gall—This appears to be nothing but an enlarged, brownish bud with a length approximately 6 mm., diameter 5 mm.

Male—Length 2.2 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, pale yellowish; 15 or 16 segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length one-half greater than its diameter and tapers slightly distally; circumfili probably

reticulate apically, though not visible in the preparation; terminal segment produced, with a length four times its diameter and tapering to a broadly rounded apex. Palp consisting of one irregularly, broadly oval segment bearing a few stout setæ subapically; eyes large, black, nearly contiguous. Mesonotum a nearly uniform fuscous yellowish. Scutellum yellowish transparent, postscutellum and abdomen light fuscous yellowish and sparsely clothed with fuscous setæ. Wings hyaline: halteres yellowish basally, fuscous apically. Coxæ, a light fuscous yellowish; femora, tibiæ and tarsi a nearly uniform light fuscous straw; claws stout, heavily curved, simple, the pulvilli more than twice the length of the claws, greatly expanded. Genitalia fuscous; basal clasp segment stout, broad; terminal clasp segment moderately long, swollen near the middle and tapering uniformly to the obtuse apex and the irregular base; dorsal plate long, broad, deeply and triangularly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate long, broad, broadly rounded apically. Harpes apparently represented by divergent, broad, slightly chitinized, submedian processes, obliquely truncate and narrowly rounded distally.

Female—Length 3 mm. Antennæ extending to the second abdominal segment, sparsely haired, fuscous yellowish; 14 or 15 subsessile segments, the fifth with a length about twice its diameter, a subbasal whorl of moderately short, stout setæ and subapically low, very irregularly reticulate circumfili forming three or four transverse bands (circumfili distinctly visible in only one specimen, a2694); terminal segment compound, consisting of two or three segments, closely fused and with a length three to five times its diameter; eyes large, black. Mesonotum dark yellowish brown. Scutellum and postscutellum a little lighter. Abdomen yellowish white, sparsely clothed with fuscous hairs. Ovipositor short, stout, the terminal segment with a length one-half greater than its diameter, slightly and variably chitinized basally and ventrally, the terminal lobes broad, broadly rounded and sparsely setose. Other characters-nearly as in the male. Type Cecid. a 2693.

***Asphondylia sesami*, n. sp.**

The Gingelly gall fly, according to Prof. T. Bainbrigge Fletcher, Imperial Entomologist of the Agricultural Research

Institute, Pusa, Bihar, India, attacks young Gingelly (*Sesamum indicum*) capsules, producing a wrinkled, twisted gall instead of the fruit. He has figured the adult and gall on page 364 of his work on South Indian Insects, 1914, and classifies this insect as one of the minor pests. He has kindly placed reared specimens, which were labeled South India, Coimbatore, June, 1912, and 1913, at our disposal, and the species is described as new.

Exuvium—Length 4 mm., a nearly uniform chestnut brown except for the nearly transparent antennal cases, the latter extending to the base of the second abdominal segment, the wing cases to the fourth, and the leg cases to the sixth abdominal segment. The dorsum of the abdominal segments with a scattering, and on segments five to eight, respectively, a somewhat double, transverse row of short, stout spines near the basal third and a similar, single row of rather thickly-set, almost contiguous, longer, stout spines near the middle; terminal segment with the basal row of spines distinctly double and scattering, and the distal row irregular, there being three on each side of the median line and a compound, lateral, spiny process.

Male—Length 3 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, light brown; 14 segments, the fifth with a length seven times its diameter, the twelfth with a length nearly five times its diameter, the thirteenth and fourteenth segments missing. Palpi; the first segment irregularly and roundly quadrate, with a length nearly twice its diameter, the second greatly produced, slender, sparsely setose, and with a length nearly three times that of the first. The mesonotum slaty brown, the submedian lines sparsely haired. Scutellum fuscous yellowish brown with a few setæ at the lateral angles, postscutellum a fuscous whitish. Abdomen sparsely haired, light brown, the genitalia fuscous yellowish. Wings hyaline, costa pale straw; halteres basally and apically mostly whitish transparent, the stalk dark brown. Coxæ and femora reddish brown, the tibiæ and tarsi mostly pale straw; claws long, rather slender, the pulvilli as long as the claws. Genitalia; basal clasp segment short, greatly swollen; terminal clasp segment subapical, short, greatly swollen apically and distinctly bidentate; dorsal plate short, broad, broadly and roundly emarginate. Other structures indistinct in the preparation.

Female—Length 3 mm. Antennæ extending to the third abdominal segment, the fifth with a length five times its diameter, the twelfth with a length two and one-half times its diameter, the thirteenth with a length about equal to the diameter, the fourteenth reduced, globose. Palpi; the first segment quadrate, with a length about twice its diameter, the second more slender, irregular and with a length about twice the first. Mesonotum dark slaty brown, the submedian lines rather thickly haired. Scutellum reddish brown, sparsely setose apically, postscutellum dark brown. Abdomen reddish brown, sparsely clothed with silvery setæ. Wings hyaline; halteres mostly yellowish brown, slightly darker subapically. Coxæ and legs mostly brownish straw, the distal tarsal segments somewhat darker; claws moderately stout, strongly curved, the pulvilli a little longer than the claws. Ovipositor when extended probably longer than the body, the basal segment moderately slender and with a well developed dorsal pouch, the acicula slender, acute. Type Cecid. a 2677.

***Feltiella americana*, n. sp.**

The midges described below were received from Prof. P. J. Parrott, of the Agricultural Experiment Station, Geneva, N. Y., under date of July 31, 1915, accompanied by the statement that they were reared from larvæ apparently feeding on a red mite occurring upon plum foliage. This species is quite different from an earlier described American form.

Male—Length 1.5 mm. Antennæ a little longer than the body, thickly haired, mostly whitish transparent; circumfili and numerous long setæ a light fuscous; 14 segments, the fifth having the stems with a length two and one-half and three and one-half times their diameters, respectively; terminal segment, basal portion of the stem with a length four times its diameter, the distal enlargement subcylindric, with a length two and one-half times its diameter, broadly rounded apically. Palpi; the first segment irregular, subquadrate, the second with a length about three times its width, the third a little longer, more slender, the fourth one-fourth longer than the third, more slender. Mesonotum fuscous yellowish. Scutellum and postscutellum pale yellowish. Abdomen mostly pale yellowish, slightly fuscous basally. Wings hyaline, the third vein uniting with costa at the apex of the wing, halteres

pale yellowish. Coxæ whitish, transparent, the legs a fuscous whitish transparent; claws slender, strongly curved, the anterior and mid-pair unidentate, the pulvilli about two-thirds the length of the claws. Genitalia; basal clasp segment moderately long, stout, the basal lobe long, triangular, finely setose; terminal clasp segment long, slender; dorsal plate short, triangularly emarginate, the lobes obliquely and roundly truncate, the ventral plate long, broad, truncate or slightly emarginate apically; style long, stout, roundly acute apically.

Female—Length 1.5 mm. Antennæ nearly as long as the body, sparsely haired, fuscous yellowish; 14 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length about two and one-half times its diameter; terminal segment slightly produced and tapering to a broadly rounded apex. Mesonotum dark yellowish brown. Scutellum and postscutellum yellowish. Abdomen a light fuscous yellowish. Halteres yellowish. Coxæ and femora basally yellowish white, the distal portion of femora and tibiæ a light fuscous straw, the tarsi darker. Ovipositor short, the terminal lobes irregularly ovate and rather thickly setose. Other characters practically as in the male. Type Cecid. a2679.

NOTES AND QUERIES.

NOTES FROM CLEMSON COLLEGE, S.C.

On Aug. 8th a large number of specimens of *Anosia plexippus* were taken in a pasture near the College. They were the stragglers of a swarm of this species passing through on that date. They disappeared two days later.

There was an outbreak of Army Worms (*Laphygma frugiperda*) in August. The principal disturbance occurred throughout the northern and eastern counties of the State. As usual, the attack began on crab grass and sorghum. In some sections peas were slightly damaged. The generation went into pupation Aug. 20-30, having done no serious damage. During this outbreak the larvæ of *Calosoma calidum* played an unusually conspicuous role. They

were very abundant in the fields around Glemson, and numerous specimens were sent from various sections of the State for identification. On Aug. 23 the writer collected a large number of specimens to observe their habits in the Insectary. They showed cannibalistic habits, a number of them being killed in this manner. The specimens were kept in jelly glasses containing sand and placed in a dark box. They were fed on Army Worms. On Aug. 25th they refused to eat, and on Aug. 28th they burrowed to the bottom of the sand and changed to the white pupæ, the adults emerging from four to six days later. Farmers sent the black larvæ to find out the name, on account of its good work in destroying the Army Worm.

On Sept. 22nd this office received a report from W. R. Pritchard, Hardeville, S. C., of the great damage being done to his cotton by caterpillars. G. M. Anderson, of this Division, who was stationed at the Columbia laboratory, made a thorough inspection of Mr. Pritchard's farm. He found that the caterpillars were *Alabama argillacea*, and that they were distributed over about fifteen acres of cotton, five of which had been seriously injured. They had nearly all gone into pupation on that date. No other report of damage has come to our attention during the season.

Clemson College, S. C.

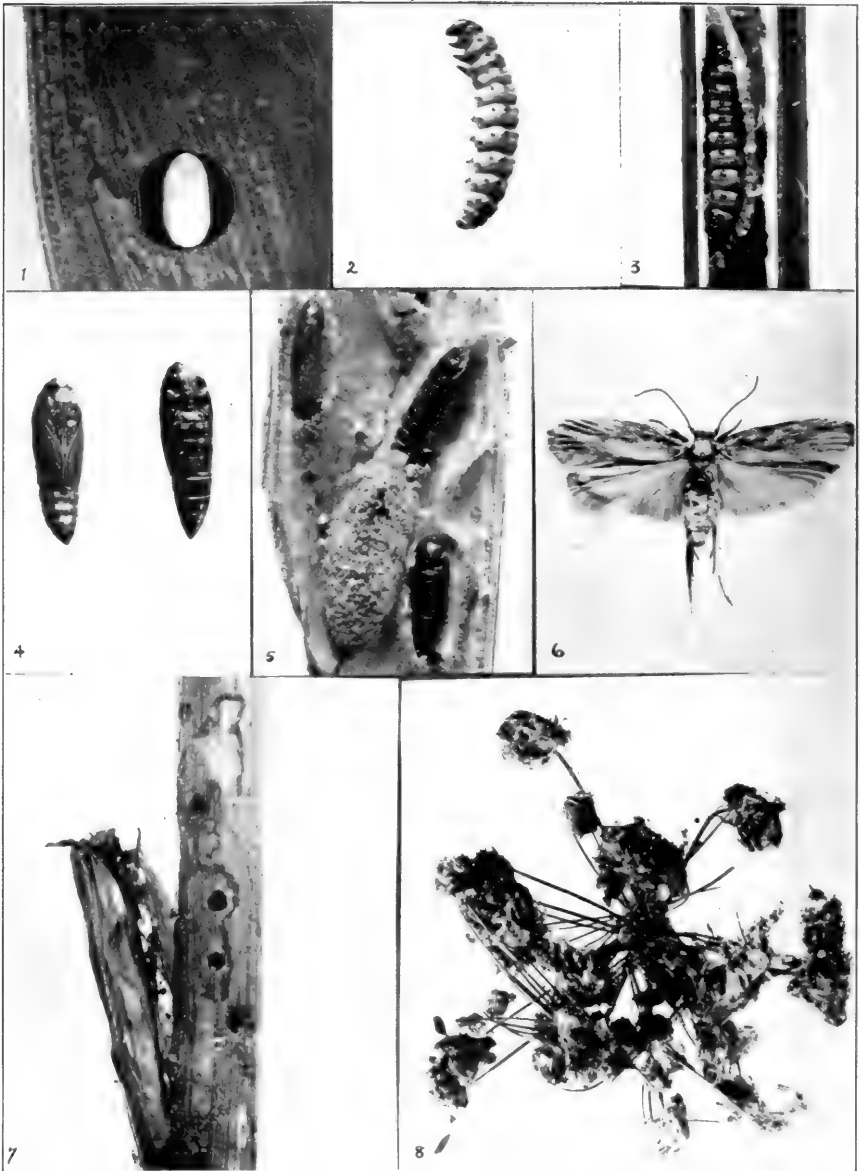
M. R. SMITH.

NOTES FROM NEW JERSEY.

Halticus citri Ashm. injuring phlox in New Jersey (Hemip.). This "flea-hopper," according to "Insects of New Jersey," where it is listed as *Halticus uhleri* Giard, seems to be fairly well distributed over the State, specimens having been taken at Madison, New Brunswick, Jamesburg and Camden County. As no food plants are mentioned, the insects were evidently taken while sweeping. During September, 1915, this species was found injuring phlox growing in a nursery at Riverton. Most of them were found on the under sides of the leaves, and the injury appeared on the upper surface as small, irregular, whitish patches, resulting in a discoloration of the foliage. Dr. F. H. Chittenden mentions it

as attacking chrysanthemum, morning-glory and smilax in green-houses, while Prof. F. M. Webster records it as feeding on many weeds, such as ragweed, crab grass, smartweed, etc. It is probably known best as a garden pest, being injurious to beans, beets, peas, cabbage, potatoes, etc. Considering the fact that the infestation on phlox was most severe after the blooming period was over and at a time when the plants were no longer cared for as ornamentals, it was not necessary to spray. Had it occurred earlier in the season any of the ordinary "leaf-hopper" remedies would have undoubtedly checked it successfully.

HARRY B. WEISS, New Brunswick, N. J.



THE PARSNIP WEBWORM.
(*DEPRESSARIA HERACLIANA* DEC.)

The Canadian Entomologist.

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No. 2

POPULAR AND PRACTICAL ENTOMOLOGY.

AN INSECT ENEMY OF THE PARSNIP.

BY W. H. BRITTAIN AND C. B. GOODERHAM, TRURO, N. S.

For a number of years the work of the Parsnip Webworm (*Depressaria heracliana* Dec.) has been noticed on the wild parsnip (*Heracleum lanatum* Michx) growing in the vicinity of the Agricultural College, Truro. In the summer of 1914 an attempt to grow some cultivated parsnips for seed on the College Farm was unsuccessful owing to the attacks of this insect. The shortage in the supply of vegetable seed during the past season, consequent upon conditions in Europe, has given an impetus to the local production of such seed. As a result a number of our farmers have planted small plots of parsnips for seed purposes, but with rather disappointing results, as many complaints have reached us of serious damage occasioned by this pest. It would therefore appear that a brief description of the insect, with notes on its life history and habits, would be particularly opportune at the present time.

Description:

The Egg.—Stainton* says regarding the oviposition habits of the insect: "The egg of this species is no doubt deposited in spring on the undeveloped umbels of *Heracleum spondylium* by the hibernated female." Other writers have quoted Stainton in this connection, but though a number of entomologists have informed us that they are well acquainted with the egg, we have not been able to discover any further reference or any description of this stage in the literature at our disposal.

The eggs are small, more or less rectangular in outline, with rough edges, measuring .32 - .40 mm. in length, and .17 - .19 mm. in width. They are pearly white in colour and ribbed longitudinally, as shown in fig. 1.

*Stainton, H. T., Nat. Hist. Tineina, Vol. V, Part 1, 112-113 (1861).

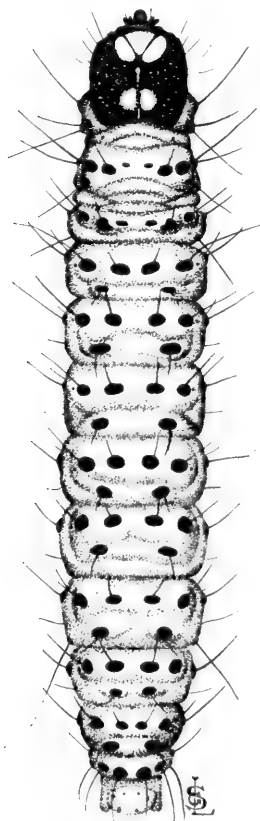


Fig. 1. Parsnip Webworm,
mature larva (X 6)

The Mature Larva.—Length 16-18 mm.; diameter of second abdominal segment 3 mm.; width of head 1.75 mm. The shape is nearly cylindrical, tapering slightly towards both extremities. The general colour is greenish yellow above, light yellow on sides and beneath. The head, mouth parts, cervical shield, thoracic legs and spiracles are shiny black.

The head is notched or emarginate on its caudal border and the cervical shield is divided by a median longitudinal line. The body is beset with numerous shiny black setigerous warts or tubercles, as shown in the figure.

The Young Larva.—The larva in its first instar is 1.5-2 mm. long and differs very little from the mature larva except in size and in being a darker greenish yellow anteriorly and a lighter yellow posteriorly.

The Pupa.—The pupa measures 1 mm. long and .3 mm. wide. The thoracic segments are dark brown and the abdominal segments a lighter brown.

The Adult.—The adult is a greyish moth with a wing expanse of $2\frac{1}{2}$ mm.

The wings are of a satiny lustre and fringed with long hairs. The front wings are a dark grey with darker longitudinal streaks, the hind wings a uniform light grey. When at rest, the wings are held flat over the back, giving the insect a flattened appearance.

Life History and Habits.

The eggs were first observed this season on June 18th. They are deposited singly and in large numbers on leaves, stems, and particularly on the sheath surrounding the flower heads. The time spent in the egg stage averages about seven days, and the period of oviposition extends over a considerable period, as newly

hatched larvæ were found late in July. On hatching, the young larvæ bore through the sheath and penetrate to the young flower buds inside. Here it commences to feed and to tie the unfolding flowers together with silken threads, forming a slight silken tunnel within which it feeds. When the head at length bursts open, it may, therefore, be nothing but a mass of web with the caterpillars inside. The larva feeds thus for about four weeks upon the seeds and leaves of the plant, and then, having become nearly mature, it crawls down the stem, usually to the axil of a leaf, where it eats its way through the hollow stem and feeds for a few days until it reaches maturity. When mature, the larva builds a light cocoon of silk and excrement within which it changes to the pupal stage. The total length of the larval life averages just under five weeks, there being in all five larval instars. The pupal instar continues for three weeks, most of the adults emerging during the latter half of August, though a few belated individuals may not appear until as late as the middle of September. The adults pass the winter beneath the bark of trees, or in similar shelters. One individual was found in the late winter hidden under a rafter in a disused building on the outskirts of the College Farm.

Of the number of insects reared from the egg to the adult condition complete records were taken in the case of three individuals. This information is summarized in the following table:—

No.	Date of Hatching	Date of First Moul	Date of Second Moul	Date of Third Moul	Date of Fourth Moul	Date of Fifth Moul	Length of Larval Stage	Date of emergence of Adult	Length of Pupal Stage
1	June 25	July 2	July 7	July 12	July 17	July 29	34 days	Aug. 19	21 days
2	June 25	July 2	July 7	July 15	July 20	July 29	34 days	Aug. 19	21 days
3	June 25	July 2	July 9	July 15	July 20	July 29	34 days	Aug. 19	21 days

Geographical Distribution.

The Parsnip Webworm is an insect with a very wide distribution, having been recorded from England, Scotland, Ireland, Germany, Sweden, Finland, France and the Eastern United States and Canada. It is very common in the neighborhood of Truro, and has been sent to the Agricultural College from parts of Hants and King's Counties, as well as from New Brunswick.

Host Plants.

The plant most commonly attacked in Nova Scotia is the Cow Parsnip (*Heracleum lanatum*). The cultivated Parsnip (*Pastinaca sativa*) is usually affected whenever it is grown for seed and the Wild Carrot (*Daucus carota*) is also known to be attacked in America. Besides the foregoing, *Heracleum spondylium* and *Heracleum sibericum* serve as food plants for the insect in Europe.

Natural Enemies.

Riley states that no parasites were bred in the United States by him, but mentions the following which have been recorded by European writers: *Cryptus flagitator* Grv.; *Pimpla heraclei* and *Hoplismenus dimidiatus*; *Cryptus profligator* Grv. and *Ophion vulnerator* Grv. Bethune was also unable to secure any parasites, but states that the Hairy Woodpecker (*Picus villosus*) destroyed many larvæ and pupæ. Harrison states that the greatest natural enemy is the earwig, which destroys the pupæ.

At Truro we have reared a number of hymenopterous parasites from this insect, but these have not yet been determined.

Remedies.

Bethune suggests dusting with hellebore for controlling the Parsnip Webworm. Riley recommends spraying with arsenate or the destruction of affected stalks. A. J. Cook says that a dilute watering mixture of an arsenate is by far the best remedy; he also recommends dusting with London Purple. Harrison believes in destroying the wild plants and handpicking the parsnip flowers.

Unfortunately we have not yet succeeded in finding any remedy that will completely control this pest, though experiments on a rather small scale were undertaken this season. The habit of the insect in tying up the seed head with silk and working inside a silken tunnel makes the work very difficult.

Spraying with lead arsenate or Paris Green just as the larvæ were hatching had little apparent effect. Dusting with Paris Green 1 part to 25 parts or with air-slaked lime gave somewhat better results, and when the umbels are open, it will prevent them from damaging any new seed. It will not, however, effect the caterpillars in the umbels which have already been tied up with silk. Cutting off and burning affected seed heads, as has been suggested, would

result in the destruction of the whole crop, in places where the infestation is as severe as in the Truro district. Furthermore, it would have little permanent effect where the pest is so numerous on neighbouring wild plants. As for destroying the wild plants that harbour the insects, these are much too numerous to commend the method to the practical farmer.

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EXPLANATION OF PLATE II.

1. Eggs in place on sheath (insert, single egg greatly enlarged).
2. Larva, lateral aspect; stem cut longitudinally showing larva spinning cocoon.
4. Pupæ, ventral and dorsal aspect.
5. Stem cut longitudinally, showing cocoon and pupæ in situ.
6. Adult moth.
7. Flower head webbed up by larvæ.
8. Holes made by larvæ in stem of Cow Parsnip.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA).*

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

The following species of crane-flies were mostly obtained from the collections of the United States National Museum and the United States Biological Survey, through the kindness of Mr. Knab and Mr. McAtee. The various species will be figured in forthcoming revisional papers now in course of completion.

Family *Tipulidæ*.Subfamily *Limnobiinæ*.Tribe *Limnobiini*.Genus *Dicranomyia* Stephens.***Dicranomyia macateei*, sp. n.***Female*—Length 4.5-4.9 mm.; wing 5-5.5 mm.

Antennæ dark brown. Head dark brownish black, the frontal region more yellowish.

Frontal scutum light yellowish brown, scutellum dull light yellow. Mesonotal præscutum shiny light brown without distinct stripes. Pleura pale yellow, more suffused with brown on the dorsal sclerites. Sternum yellow. Halteres dark brown, a little brighter at the extreme base. Legs with the coxæ bright yellow; trochanters brownish yellow; femora and tibiæ yellowish brown, tarsi pale yellowish white, the terminal segment and the claws black. Wings with a dusky tinge, the stigma distinct, large, oval, brown; the base of the sector, the cord and the outer end of cell *1st M*₂ seamed with darker brown; no pubescence on the apical cells of the wings; veins dark brown. Venation with *Sc* long, extending over half the length of the sector; *Rs* long, over twice the length of the deflection of *R*₄₊₅; basal deflection of *Cu*₁ at or slightly beyond the fork of *M*; *Cu*₂ about equal to the basal deflection of *Cu*₁.

Abdomen brown, the ovipositor and the eighth segment largely yellow.

Holotype, ♀, Plummer's Island, Maryland; May 24, 1914 (McAtee).

*Contribution from the Entomological Laboratory of Cornell University.
February, 1916

Paratypes, ♀; Virginia, near Plummer's Island; July 14, 1915 (McAtee). 2 ♀'s, Great Falls, Virginia; Aug. 11, 1915, Oct. 3, 1915 (McAtee).

The type is in the collection of the Union States Biological Survey, the paratypes are in the National Museum and the collection of the author.

Tribe *Antochini*.

Genus *Teucholabis* Osten Sacken.

***Teucholabis lucida*, sp. n.**

Male—Length 3.5-4.1 mm.; wing 4.2-4.5 mm.

Rostrum and palpi black. Antennæ black. Head black with a thick light gray pubescence.

Pronotal scutum dark brownish black, the caudal margin paler, brown; scutellum pale yellowish white, interrupted medially above by a brownish depression. Mesonotal præscutum shiny black, pilose medially behind, the usual pale interspaces represented only by a small reddish brown area in front, just proximad of the pseudosutural foveæ, and a yellow median patch behind; scutum black shiny, with the median area in front pale yellow and with a short, pale pilosity; scutellum dull yellow, more grayish basally; postnotum black with a gray pile. Pleura light yellowish white with a broad black band extending from behind the pronotum beneath the wings to the base of the abdomen; a large rounded black spot on the sternum just before the middle coxæ and a smaller patch just behind these coxæ; mesosternum suffused with lemon-yellow. Halteres short, pale brown. Legs with the coxæ and trochanters pale testaceous; femora light yellow, the apex broadly blackened and slightly enlarged; tibiæ and tarsi dark brown, the former sometimes paler and narrowly tipped with blackish. Wings narrow, hyaline; stigmal spot brown, rounded, conspicuous.

Abdominal tergites black, the segments narrowly ringed with dull reddish yellow on the caudal margin; sternites blackish on the basal half, paler, yellowish, caudally.

Holotype, ♂, Dalecarlia Reservoir and outlet, District of Columbia; Aug 22, 1915 (McAtee).

Paratypes, 1 ♂; 1, sex uncertain, topotypic.

The type is in the collection of the United States Biological Survey, paratypes in the collection of the author.

Teucholabis carolinensis, sp. n.

Male—Length 4.2 mm.; wing 4 mm.

Rostrum and palpi black. Antennæ black. Head black with a slight grayish pubescence.

Mesonotal præscutum dark brownish black with a sparse grayish pile, the lateral margins of the segment broadly yellowish brown. Pleura dull brown with an indistinct dark brown stripe extending from the cervical sclerites caudad, becoming indistinct before the halteres; sternites brownish yellow without darker markings. Halteres short, pale, the knob brown. Legs with the coxae and trochanters dull yellowish; femora dull brownish yellow with the apex rather narrowly blackened; tibiæ yellowish brown, the tips of the hind legs scarcely darkened, the anterior pair narrowly blackened; tarsi black. Wings narrow, nearly hyaline, the stigma quite indistinct, the veins dark brown.

Abdomen brown, the sternites somewhat paler.

Holotype, ♂, South Island, Georgetown Co., S. Carolina; Aug. 19, 1915 (Alexander).

The type is in the collection of the author.

Tribe *Eriopterini*.

Genus *Trimicra* Osten Sacken.

? *Trimicra empedoides*, sp. n.

Male—Length 5.5-5.8 mm.; wing 7.7-8 mm.

Female—Length 5.7 mm.; wing 6 mm.

Rostrum dull yellow, the palpi brown. Antennæ having the first segment with a gray bloom, the second segment dull yellow, flagellar segments dark brown with the base more yellowish, this bicoloured appearance becoming obliterated on the terminal segments. Head pale yellow with a light gray bloom.

Thoracic dorsum light gray, without stripes, excepting a very indistinct and narrow median vitta on the extreme anterior portion of the præscutum; beneath the gray bloom are three stripes; the lateral margins of the præscutum pale, yellowish; tuberculate pits situated far back on the sclerite, about on a level with the pseudo-sutural foveæ; the interspaces between the usual thoracic stripes with sparse coarse hairs; scutellum pale flesh colour. Pleura gray and yellow, the dorso-pleural membranes more yellowish. Halteres

rather short, light yellow. Legs with the coxæ comparatively small, pale, sparsely gray pruinose; trochanters dull yellow; femora swollen, brownish yellow, very hairy; tibiae and the first segment of the tarsus dull brownish yellow, darkened at the apex, the terminal tarsal segments dark brown. Wings grayish subhyaline, the costal region yellowish brown, the veins *C*, *Sc* and *R* yellow, the remaining veins dark brown. Venation with *Sc*₂ placed very far back from the tip of *Sc*₁, but distad of the base of the sector; cells *R*₁ very broad and almost completely filled by the very large pubescent stigma; cross-vein *r* long, oblique, inserted at or slightly beyond the fork of the sector; *R*₂₊₃ long, about subequal to *R*₂ alone; basal deflection of *Cu*₁ at the fork of *M*; cell 1st *M*₂ closed.

Abdominal tergites brownish gray, broadly margined with yellow caudally; sternites similar, the pale margins less distinct; hypopygium pale.

The female is similar to the male, but smaller, the stigma very small, and in the allotypic specimen the cell 1st *M*₂ open by the atrophy of the medial cross-vein (this latter condition undoubtedly abnormal).

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; August 8, 1916 (John Woodgate).

Allotype, ♀, Ardmore, South Dakota; August 10, 1915 (E. G. Holt).

Paratype, ♂, with the allotype; August 5, 1915.

The type and the allotype are in the collection of the author, the paratype in the collection of the United States Biological Survey.

This insect is provisionally referred to *Trimicra*, but undoubtedly represents a new genus, which will be characterized in a later paper.

Subfamily *Tipulinae*.

Tribe *Tipulini*.

Genus *Tipula* Linnaeus.

***Tipula* (*Cinctotipula*) *apache*, sp. n.**

Male—Length 12.3-13.1 mm.; wing 11.8-12.2 mm.

Female—Length about 18 mm.; wing 16 mm.

Palpi black. Frontal prolongation of the head short, brown, dusted with gray above and with a narrow, linear, median, yellow,

dorsal line; nasus very long, tipped with long golden hairs. Antennæ with the scapal segments very dark brown, the flagellum black. Front bright yellow; vertex yellow, this colour continuing as a point to the occiput; sides of the vertex and occiput dark brown.

Pronotum dark brown, the scutum with three pale yellow spots, of which one is median in position; scutellum with the lateral angles yellowish. Mesonotal præscutum dark brown with a very broad median light gray stripe, which is narrowly bisected anteriorly by a brown line, the lateral stripes very indistinct, brownish yellow; lateral margins of the præscutum pale brownish yellow; scutum with the median area shiny yellowish white, the lobes black dusted with gray and margined with black; scutellum black, the median third somewhat elevated, testaceous; postnotum dark brownish black, narrowly whitish medially in front. Pleura dark brown, dusted with gray. Halteres blackish, the base more yellowish, the apex of the knob gray. Legs with the coxæ brownish black; trochanters dark brown; femora and tibiæ dark brown narrowly blackened at the apex; tarsi dark brown. Wings infused with dusky, a dark oval stigmal blotch; a vitreous band before the cord crossing the base of the elongate cell *1st M*₂ and extending into cell *M*₄; a vitreous spot beyond the stigma in cell *2nd R*₁; a number of short hairs in cell *R*₅ and the tip of *M*₁.

Abdominal tergites largely brownish yellow, the caudal margin and the lateral margin except at the base brownish black; ninth tergite dark brown. Sternites similar, the extreme caudal margins of the sclerites with a fringe of pale appressed hairs.

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; July 20, 1915 (Woodgate).

Allotype, ♀, South Fork of Eagle Creek, White Mts., New Mexico; altitude about 8,000 feet; August 13 (C. H. T. Townsend); at light.

Paratypes, 2 ♂'s, topotypic; July 12, 1915 (Woodgate).

The allotype is in the collection of the United States National Museum; the type and paratypes are in the collection of the author.

***Tipula caroliniana*, sp. n.**

Male—Length 18-19 mm.; wing 19-21 mm.

Palpi dark brown. Frontal prolongation of the head rather long, light brownish gray. Antennæ with the first segment brown,

the second segment and the apex of the first bright yellow; flagellar segments with the basal enlargement very prominent, blackened, the remainder of the segments dark brown, the apical segments more uniform; antennæ elongated for this group of species. Head brownish gray, clearer and brighter toward the occiput and around the eyes; the vertex with a low tubercle bearing an impressed median line; a circular to transverse impressed mark just behind the base of the antennæ meeting on the middle line before the tubercle.

Mesonotal præscutum light gray, the stripes darker gray to brown, narrowly margined with dark brown; the median stripe is bisected by a pale line, which is likewise margined with brown; scutum brown with two light gray spots on each lobe, the largest lying caudad and proximad; scutellum and postnotum light gray, with a narrow brown median line. Pleura with the dorso-pleural membrane dull yellow, the sclerites light gray with a rounded brown spot just beneath the anterior spiracle and a smaller one on the mesopleura. Halteres light yellow, the knob brown. Legs with the coxæ dusted with light gray; trochanters brownish yellow; femora brown, the apex darker; tibiæ brown, lightest at the base; tarsi brown. Wings with a light gray tinge, the costal cell more yellowish, stigma brown; a brownish blotch at the arculus and the origin of *Rs*; veins and the deflections of veins narrowly seamed with brown; hyaline spots before the cord, beyond the stigma in cell *2nd R*₁, base of *R*₂ and *R*₃; a rounded blotch in cell *M* at two-thirds the length of the cell; pale flecks in cell *1st A*.

Abdominal tergites varying from almost clear yellow throughout to a brownish yellow, the caudal margin narrowly yellowish, the lateral margins narrowly grayish; the base of the tergites with a transverse rectangular coarsely punctured area on either side of segments 3 to 5, somewhat as in *T. discolor* Loew and similar species; second sternite brownish yellow with a large rounded black spot at the base; segments two to five with punctured areas on the sides of the sclerites, on segments two, four and five transverse, on segment three oblique; apical sclerites brown, broadly yellowish on the caudal margin. Ninth tergite yellowish, the caudal margin with a small, shallow, rounded or rectangular median notch, the lateral lobes broad, obliquely truncated; dorsal surface with a

small black chitinized point on either side of the middle line connected transversely.

Holotype, ♂, North Carolina. From the collection of C. V. Riley in the United States National Museum.

Paratypes, 3 ♂'s, topotypic.

The type and a paratype are in the collection of the United States National Museum, the remaining paratypes are in the collection of the author.

This species falls in the same group with *angustipennis* Loew, *balioptera* Loew, *centralis* Loew, *serta* Loew, *septentrionalis* Loew, etc., from all of which it is easily separated by the structure of the male genitalia.

***Tipula texensis*, sp. n.**

Male—Length 11.3-12.5 mm.; wing 11.5-15 mm.

Female—Length 13.4-13.6 mm.; wing 12.5-14 mm.

Palpi dark brown. Frontal prolongation of the head dark brown, with a sparse light gray bloom. Antennæ with the first segment yellowish brown, with a sparse grayish bloom; second and third segments yellow or brownish yellow, the remaining flagellar segments yellow or dark brown basally, the terminal segments more uniformly dark brown. Head light gray, more yellowish on the occiput on either side of the median area; a delicate impressed, median, brown, dorsal line.

Mesonotal præscutum light gray with dark brown stripes, the middle stripe broadly bisected by a vitta of the ground colour, which in turn is split medially by a delicate brown line; lateral stripes almost confluent with the median stripe; scutum light gray, the lobes with an oblique brown mark; scutellum grayish testaceous, with a very delicate median brown line; postnotum light gray with or without a rather indistinct, impressed, median, brown line on the caudal fourth of the segment. Pleura light gray, indistinctly spotted with brown, the dorso-pleural membrane dull yellow. Halteres with the base bright yellow, darkening into brown on the knob. Legs yellow, with a grayish white bloom; trochanters yellow; femora dull yellow, the apex dark brown; tibiae yellowish brown, only a little darkened at the apex; tarsi dark brown. Wings light gray, the stigma rectangular, brownish yellow; brownish blotches

at the origin of *Rs*, at about mid-length of cell *R* and in the middle of cell *R*₂; hyaline blotches in cell *R* between the brown spots; a hyaline band before the cord; beyond the stigma in cell *2nd R*₁ and in the bases of cells *R*₂, *R*₃ and *R*₅; tip of cell *R*₂ hyaline; cells *M*₁ and *1st M*₂ largely hyaline.

Abdominal tergites brownish yellow, with a very indistinct, interrupted, brownish, dorsal band becoming more distinct behind; a broad sublateral dark brown band on each side, lateral margins of the sclerites broadly, the caudal margins narrowly and indistinctly, whitish; sternites dull yellowish brown, darkest on the seventh and eighth segments; in some specimens indistinctly and interruptedly trivittate.

The female is similar, with the antennal flagellum almost uniformly dark brown; the median abdominal vitta distinct.

The maximum measurements given for the male sex are those of the holotype, a large and finely coloured specimen.

Holotype, ♂, Dallas, Texas; April 7, 1906 (F. C. Pratt).

Allotype, ♀, Kerryville, Texas; March 25, 1908 (F. C. Pratt).

Paratypes, ♂, with the allotype; April 11, 1907; ♀, San Augustine, Texas; March 22, 1908 (E. S. Tucker).

The type and the paratype female are in the collection of the United States National Museum; the allotype and the paratype male in the collection of the author.

***Tipula aspidoptera*, sp. n.**

Male—Length 13.5-14.3 mm.; wing 13.6-15 mm.

Female—Length 15 mm.; wing 4.9-5 mm.

Palpi brown. Frontal prolongation of the head brownish gray, nasus short, but prominent with a few scanty hairs at the tip. Antennæ with the three basal segments light brown, the remainder of the antennæ uniform dark brown. Head light gray with a very narrow, indistinct median brown line.

Pronotal scutum light gray, the scutellum largely yellow. Mesonotal præscutum light gray, the median brown stripe very broad, a little narrowed behind, the lateral stripes rather indistinct; scutum, scutellum and postnotum light gray. Pleura with the dorso-pleural membrane yellow, the pleura clear blue-gray. Halteres long, slender, brown. Legs with the coxæ clear blue-gray; trochanters gray; femora brownish yellow, only a little darkened

at the tip; tibiae yellowish brown, a little darker at the tip; tarsi dark brown. Wings pale brownish gray, the stigma brown, the costal cell brownish yellow; wings streaked with hyaline, this colour including the basal cells and cell R_5 except the tip; cell $1stA$ hyaline, except the broad apex.

Abdomen brownish gray, clearer gray laterally, the caudal margin narrowly brownish yellow; ninth tergite broadly tipped with bright yellowish; sternites grayish brown.

The female is similar to the male, but the antennae are shorter, the wings reduced, extending about to the end of the third abdominal segment; valves of the ovipositor rather short, the tergal valves only a little longer than the sternal pair.

Holotype, ♂, Bred from larvæ taken at Alvarado, Texas (Hill); issued March 5, 1881.

Allotype, ♀, topotypic.

Paratypes, ♂, ♀'s, topotypic; ♂, Dallas, Texas; April 16, 1906 (W. D. Hunter).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

This interesting species of the *tricolor* group was bred from larvæ received in Washington, February 26, 1881, by Mr. Pergande from Mr. Jesse M. Hill, Alvarado, Texas. The specimens were given the lot-number 846 and the first fly issued March 5, 1881, the last on March 22, 1881 a total of some 13 males and 11 females, most of which are still in existence. This insect was determined as *T. eluta* Loew with a question by Coquillett, which, however, has a long-winged female and the antennae bicolorous. In its unicolorous antennae it likewise differs from *Tipula subeluta* Johnson, which has bicolored flagellar segments, as clearly stated in the original characterization of the species, although Dr. Dietz's key is misleading in this regard.

***Tipula comanche*, sp. n.**

Male—Length 11.2 mm.; wing 12.4 mm.

Female—Length 10.9 mm.; wing 11 mm.

Palpi brown. Frontal prolongation of the head rather long, light gray, the nasus very short. Antennae with the first segment

rather long, brownish gray, the second segment yellowish brown, the flagellum elongated, the segments dark brownish black throughout, slightly incised beneath. Head light gray with a narrow, median, brown vitta.

Mesonotal præscutum light gray with three brown stripes, of which the lateral pair are shortened; scutum with the lobes light gray, indistinctly brown in the centre; scutellum and postnotum light gray, the latter more whitish. Pleura with the dorso-pleural membrane yellowish, the sclerites clear blue-gray. Halteres elongate, light brown, the knobs darker. Legs with the coxae pale, with a sparse whitish or gray bloom; trochanters brownish yellow; femora brown, darkened on the apical half; tibiæ and tarsi brown. Wings with a very pale picture, much paler than the similar *eluta* Loew and *aspidoptera* n., and in some respects suggesting *sayi* Alexander; the costal cell is yellowish; stigma rounded, yellowish brown; the membrane of the wing grayish hyaline, darkest on the apex and in the caudal cells; cell *R*₅ almost hyaline like the basal cells.

Abdomen brownish gray, the lateral margins of the segments broadly dull yellow, the caudal margins narrowly ringed with the same colour; hypopygium yellowish.

Holotype, ♂, Paris, Texas; April 13, 1904 (A. A. Girault).

Allotype, ♀, topotypic.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

***Tipula guasa*, sp. n.**

Male—Length 8.5-10.3 mm.; wing 8.5-10.9 mm.

Female—Length 11.2 mm.; wing 9 mm.

Palpi brown, the third segment pale at the base. Frontal prolongation of the head rather short, nasus not very prominent; the prolongation yellow, more brownish beneath, with a subimpressed brown lateral line and a sparse gray bloom on the dorsal surface. Antennæ with the first segment brown, the second segment paler, the apices of the scapal segments pale; flagellum short, dark brownish black, the segments short, broad basally, narrowed toward their tips, the segments not incised. Head dark brown, paler adjoining the eyes, a little grayish on the middle line

of the occiput; in some specimens the head is gray, with only the centre of the vertex dark brown.

Pronotal scutum grayish brown; scutellum clear light yellow. Mesonotal præscutum grayish brown, the area before the pseudosutural foveæ paler, yellowish; the usual lateral stripes are indistinct, but margined narrowly with dark brown; of the middle stripe only a single narrow dark brown line persists; the thoracic stripes in some specimens are quite obliterated; extreme lateral margin of the sclerite grayish; pseudosutural foveæ very large, black; scutum grayish brown, the median area more yellowish, the lobes marked with brown; scutellum testaceous, more yellowish on the sides; postnotum lead-coloured, with a distinct median yellow vitta. Pleura yellow, with blue-gray blotches. Halteres rather short, yellowish brown, the knobs dark brown. Legs having the coxæ yellowish with a gray bloom; trochanters and femora dull yellow, the latter passing into brown on the terminal half; tibiæ dull yellowish brown, darker apically; tarsi dark brown. Wings grayish subhyaline, the costal region a little more yellowish, stigma pale brown.

Abdominal tergites dark yellow, with a very broad median brown band, the caudal margin narrowly ringed with brown; ninth tergite dark brown with the caudal half yellowish; sternites yellow, indistinctly and broadly suffused with brown.

The female has the tergal valves elongate, subacute, dark brown, the sternal valves shorter, more yellowish, acute.

The paratype males from Calvert are much larger (the largest measurements given above) but in all other respects are indistinguishable from the small specimens taken at the type-locality.

Holotype, ♂, Liberty, Texas; March 18, 1908 (E. S. Tucker).

Allotype, ♀, topotypic.

Paratypes, 4 ♂'s, topotypic; 3 ♂'s, Calvert, Texas; April 19, (W. W. Yothers).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

The specific name is that of a native Indian tribe.

***Tipula arizonica*, sp. n.**

Male—Length 9.8-10 mm.; wing 11.3 mm.

Female—Length 14.5 mm.; wing 14 mm.

Palpi pale yellow with black hairs, the third segment with a sparse pale gray bloom, the terminal segment dark brown. Frontal prolongation of the head elongate, shiny yellowish, the extreme base light gray; nasus prominent. Antennae indistinctly bicolorous, the basal segments light yellow; the third segment yellow, passing into brown on the apical half; remainder of the flagellum dark brown, the basal enlargement a little more intense, the segments slightly incised. Head light gray with a subimpressed, very indistinct median brown line; a row of large hairs following the inner margin of the eye.

Thoracic dorsum opaque light yellow, without distinct stripes, although they may be faintly indicated beneath the bloom. Pleura yellow, with a sparse whitish bloom. Halteres rather short, but slender, brown, the knob a little darkened. Legs with the coxae yellow, very sparsely white pollinose; trochanters yellow; femora light yellow, soon passing into brown; tibiae brownish yellow; tarsi brown. Wings hyaline or nearly so, the costal cells yellowish, the stigma a little brownish, veins brown.

Abdominal tergites yellow, the segments three to six more brownish, the segments broadly ringed with silvery; a rounded brown spot on the sides of segment two beyond mid-length of the sclerite; rounded brown spots on the sides of segments three to five at the base; hypopygium brownish; sternites yellow, the sclerites somewhat indistinctly ringed with silvery. Ninth tergite large, the lateral angles produced slightly and bent strongly ventrad; eighth sternite very large, prominent, the apex with a dense brush of yellow hairs.

The female is like the male, but the antennae are shorter and more distinctly bicolorous; the spots on the sides of the abdomen rather distinct; tergal valves of the ovipositor very long, the tip rounded, the sternal valves very short, the apex abruptly truncated.

Holotype, ♂, Williams, Arizona; May 30 (H. S. Barber).

Allotype, ♀, topotypic; May 29.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

THE BEES OF THE CORONADO ISLANDS.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Out in the Pacific, on the edge of the continental shelf, southwest of San Diego, California, are the Coronado Islands. They consist of four rocky elevations, submerged mountain-tops apparently; the largest, South Island, about two miles long. They belong to Lower California, and hence are part of Mexico. Formerly they were difficult of access, but now a small vessel makes daily trips from San Diego, and tourists visit the islands in numbers. On August 21, 1915, my wife and I spent two hours on South Island, collecting the hitherto unrecorded insect-fauna, and especially the bees.*

Such isolated spots are extremely interesting to the evolutionist. Their fauna and flora may throw light on the rate of modification of species, or they may preserve formerly widespread, but now nearly extinct, types. The vertebrates of the Coronados have already been rather carefully studied. They possess a mouse, *Peromyscus maniculatus dubius* Allen, which occurs elsewhere only on Todos Santos Islands, Lower California. It is a relatively large, dark form. The birds, 22 species, have been fully discussed in a very interesting paper by J. Grinnell and F. S. Daggett in *The Auk*, XX, 1903, pp. 27-37. One of them, *Melospiza coronatorum*, is peculiar to the islands, differing from its mainland relative by its much paler ground colour, narrower streaking and smaller bill. Another, *Carpodacus clementis*, agrees with a San Clemente I. form, and differs from that of the mainland by the bulky bill and heavy brown streaking. Thus it appears that the modification, when there is any, may be in quite opposite directions. Nine species of reptiles are recorded by Van Denburgh and Slevin, the most interesting being *Gerrhonotus scincicauda ignavus*, which belongs otherwise to the islands northward, Catalina and San Martin. The plants have been little studied, but a fine Malvaceous species,

*Dr. E. P. Van Duzee, in his account of the Hemiptera of San Diego and vicinity, appears to record species from North Island Coronado but as his preface shows, they came from the north end of Coronado Beach, San Diego, locally called North Island. There is a possible source of confusion here, to be guarded against.

Lavatera (Saviniona) insularis Watson, is peculiar to the islands. We found that one of the commonest species on South Island was *Hazardia berberidis* Gray, described from All Saints Bay, Lower California, and not found in the United States. I am indebted to Mrs. K. Brandegee for its identification. This is not the place to discuss the flora at length, but it may be added that already introduced weeds are becoming abundant in places, more particularly the European grass *Achyrodes aureum* Linn. (det. Agnes Chase). An abundant native fern proved to be *Pellaea andromedæfolia* Kaulf (det. Maxon).

We found a single species of snail, *Micrarionta stearnsiana* Gabb, in great abundance. It is a species characteristic of Lower California, extending up the coast to the region about San Diego.

Among the insects, by far the most conspicuous species, occurring in great numbers, was a very fine *Pepsis* with red wings. I cannot, at present, separate it from the common *P. formosa* Say (*chrysothemis* R. Luc.), though it seems somewhat different from a specimen collected in New Mexico. These wasps were observed to prey on the large "tarantula" spiders, which apparently belong to *Avicularia californica* Banks, described from near San Diego. Other wasps taken were an *Odynerus* and an ordinary-looking black *Priononyx*. The common ant of South Island is *Messor andrei* Mayr. The only butterfly seen, but this abundant, was *Lycaena exilis* Boisd.; a little larger than the form of the species found in New Mexico. A specimen of *Hippodamia convergens* Guér. was collected. Various other insects, some of which look interesting, will be reported on at a later date, when they can be determined.

The bees number seven species, of which three are new, but one of them was also taken on the Californian coast. There are only two genera.

***Anthophora californica* Cresson.**

One male, at flowers of *Hazardia berberidis*. A form with hair on thorax above paler than usual. Eyes yellowish green in life.

***Anthophora urbana* Cresson.**

One male. A variety with dark tegulae.

***Halictus catalinensis* Cockerell.**

Five females. The abdominal hair-bands vary from fulvous to greyish white. The species was described from Catalina Island.

***Halictus coronadensis*, n. sp.**

Male.—Length about 6.5 mm.; slender, head and thorax dark green, abdomen very obscurely greenish, almost black; hair of head and thorax moderately abundant, erect, pure white; clypeus greatly produced, the free lateral margins not much less than half diameter of apex; malar space short; mandibles with a ferruginous subapical band; hair of face beautifully plumose, dense at sides; supraclypeal area shining yellowish green; eyes deeply emarginate; front dull; ocelli rather large; antennæ very long, flagellum light fulvous beneath; mesothorax dull, with a minutely granular appearance; scutellum shining, sparsely punctured; area of metathorax with very fine radiating striæ, and no sharp edge; posterior truncation not sharp-edged; tegulæ fulvous, dark at base; wings ample, hyaline, faintly greyish, stigma and nervures dusky brown; outer nervures not weakened; first r. n. joining second s. m. a short distance before end; third s. m. much broader above than second; legs black, the femora green behind; abdomen dull, appearing minutely granular, constricted at the ends of the first three segments, the extreme margin coppery-red; no bands, but surface of abdomen, especially at sides, with conspicuous erect hair; ventral segments not modified, except that the sixth has a delicate median raised line.

Type locality, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Also collected at La Jolla, California, August (*Cockerell*). When I collected these, I supposed I was getting males of *Halictus catalinensis*, of which the females occurred at the same place on the Coronado Is., but on examination it is impossible to associate the insects, which differ in many particulars, but especially in the shape of the face. The male of *H. catalinensis* is presumably more or less like that of the allied *H. provancheri*, but the new form is entirely different from *provancheri*. It appears to be a quite isolated form, standing between *Halictus* and *Augochlora*. The strongly emarginate eyes would suggest its reference to *Augochlora*, but the venation and coloration are those of *Halictus*.

***Halictus grinnelli*, n. sp.**

Female.—Length about 5.5 mm.; robust, head and thorax olive green, abdomen and legs black; pubescence white, not very

abundant; head broad; clypeus not much produced, the lower half black; supraclypeal area brassy; front and sides of face well punctured, the middle of front as closely punctured as possible, not striate; antennæ black; cheeks shining; mesothorax shining, strongly and rather closely punctured all over; scutellum closely, more finely punctured; area of metathorax strongly sculptured all over with anastomosing ridges, producing a finely reticulate effect; tegulæ rufofusca with paler margins, impunctate; wings hyaline, not reddish; stigma and nervures reddish testaceous; hind spur with three long blunt spines, the basal one remarkably long; first abdominal segment smooth and shining, though minutely punctured; the other segments duller and more punctured, those beyond the second pruinose with pale hair.

South Island, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Five females, visiting Compositæ. One would not take this for a southern or desert species; it rather has the aspect of those of the mountains and of the north. It falls near to *H. perpunctatus* Ellis, but has the mesothorax more coarsely and less densely punctured, wings not reddish, area of metathorax shorter, etc. A related but quite distinct form, which Mrs. M. D. Ellis has named in manuscript as a subspecies of *H. perpunctatus*, occurs in Southern California. I have named this species and the next after the naturalists to whom we are indebted for an excellent account of the birds of the Coronado Islands.

***Halictus daggetti*, n. sp.**

Male—Length about 5.5 mm.; head and thorax olive green, abdomen black; pubescence white; clypeus moderately produced; face and front hairy; antennæ very long (reaching middle of metathorax), flagellum rather thick, ferruginous beneath, narrowly so on the apical part; inner orbits submarginate; mesothorax and scutellum brilliantly shining, well punctured, sparsely on disc of mesothorax; area of metathorax sculptured essentially as in *H. grinnelli*; tegulæ shining piceous; wings milky-hyaline, stigma testaceous bordered with fuscous, nervures fuscous, second s. m. narrower above; mesopleura closely punctured; legs black, with pale hair; abdomen shining, but finely and rather closely punctured, with erect pale hair, especially conspicuous at sides; the suture

between the first and second dorsal segments deeply constricted, that between the second and third moderately constricted.

South Island, Coronado Islands, Aug. 21, three males (*T. and W. Ckl.*). I at first supposed that this was the male of *H. grinnelli*, but the thorax and wings are so different that it seems necessary to regard it as a distinct species.

***Halictus nevadensis* Crawford.**

One female taken; a little larger than the mainland form, which is apparently the commonest small green *Halictus* of Southern California. I took the species at the Scripps Institute, La Jolla, and at Orange.

NOCTUID NOTES FROM WESTERN CANADA, WITH
DESCRIPTION OF TWO NEW SPECIES AND
A VARIETY.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

***Cucullia omissa*, sp. nov.**

Closely allied to *asteroides* Guen. and *postera* Guen. It principally differs from *asteroides* in being darker throughout, and having dark secondaries in both sexes. Even the darkest specimens of *asteroides* seem always to have a faint violaceous tinge to the grey of the thorax and primaries, which *omissa* always lacks. The discoidal spots are even less distinct than in *asteroides*. In all *asteroides* which I have examined the secondaries are clean pearly white in the basal half or two-thirds, with a very irregular and narrow dusky outer border in the male, and a broader and darker one in the female. In all my *omissa* the secondaries are fuscous throughout, though palest basally. As is the case in *postera*, or at least in the prairie form of that species, the secondaries are practically alike in both sexes.

In a few of the darkest specimens there is a small discal spot on the secondaries beneath. Some specimens come very near the prairie form of *postera* in colour, but the new species is less maculate and streaky than that, and the discoidal spots are much less distinct, being in fact almost obliterated by the rusty red shade overlaying the cell and areas immediately beyond it. The longitudinal streak at the anal angle, the preceding crescent and cloud,

are exactly as in *postera* and *asteroides*. A dark brown streak bordering the full length of the inner margin exists in all *omissa* under examination, and is usually more obvious than in *asteroides*, much more so than in *postera*, from which it is often altogether absent. Size of *asteroides*.

Described from 13 ♂♂ and 8 ♀♀. Localities: 5 ♂♂, 2 ♀♀, Head of Pine Creek, near Calgary; May 18th (one), June 25th to August 13th, collected by the author; one pair, Windermere, B. C., July 12th, 1907 (the author); 1 ♀, Nelson, B. C. (H. Cane); 1 ♂, 3 ♀♀, Aweme, Man., June 6-14, 1910 (Criddle); 6 ♂♂, Cartwright, Man. (Heath collection); 1 ♀, Hymers, Ont., July 11th, 1912 (H. Dawson); and 1 ♀, Breezy Point, N.H., July 2-9, 1912 (L. W. Swett).

Types — ♂ in the author's collection, ♀ in that of Dr Wm. Barnes. Both Calgary specimens. My notes tell me that there is a specimen of this species in the British Museum from Denver, Colo., as well as typical *asteroides* from the same locality. I also have a Denver *asteroides* in my own collection.

Omissa is the No. 359 of my Alberta list, originally entered as *postera* on Smith's authority, and is the *postera* of the Kootenai and B. C. lists (Can. Ent., XXXVII, 227, June, 1905, and XLV, 94, April, 1913). The Manitoba specimens, some of which I am making co-types, are the darkest of the lot both in primaries and secondaries, and compared with Calgary, B. C., and Ontario specimens, have less of the rusty red through and beyond the cell, and contrast more strongly with *asteroides*. In fact, though I choose the actual types from Calgary, it was a study of Manitoba material which finally decided me that the form was distinct. I found a short series of both *omissa* and *asteroides* in the Heath collection, and Mr. Wallis kindly loaned them to me for study. They were all on short pins, and it is reasonable to suppose that they were collected at Cartwright, especially as both have been taken at Treesbank, about fifty miles distant.

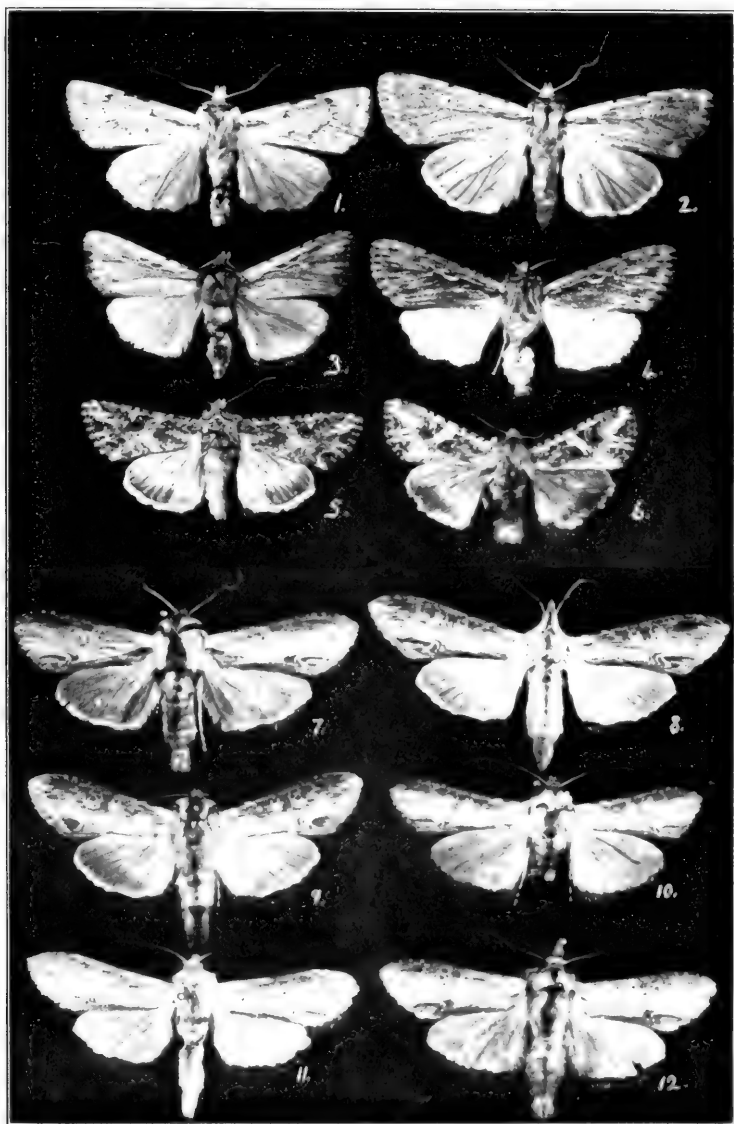
Mr. Tams has prepared two mounts of male genitalia of *omissa*, from Calgary and Aweme, and we have compared them with two of *asteroides* from Chicago and Cartwright, and one of British *asteris*, which agrees closely with Pierce's figure and description. The two *omissa* differ from the two *asteroides* in one

detail, and in that detail the deviation in the former is distinctly in the direction of *asteris*, which it resembles very closely in these organs. In *asteris*, as Mr. Pierce expresses it, "the clavus is produced to a small irregular knob, spinose." In *omissa* there is a distinct rounded spinose prominence on the clavus, though it is not similarly produced to a knob. In both my *omissa* mounts this prominence occupies the same relative position on the clavus as it does in Pierce's figure, and the clavus is much the same shape. But in my mount of *asteris* the clavus is shortened off abruptly immediately above the knob. In neither of the mounts of *asteroides* is there anything more than the faintest indication of this prominence. *Asteris* possesses two cornuti on the vesica, whereas *omissa* and *asteroides* possess only one. Superficially, also, the new species resembles *asteris* in colour and arrangement of shades more closely than does *asteroides*.

***Copablepharon viridisparsa*, sp. nov.**

Head, thorax and primaries almost white with a very pale tinge of greenish ochreous, most pronounced in the female. The primaries have a slight irroration of grey scales, most numerous in the male, giving them a slightly sordid appearance. The male has a transverse posterior row of minute black points on the veins, very faintly indicated. Secondaries dull white in the male, with slight fuscous shadings and a fuscous central cloud; in the female a little darker and more shaded, though the central cloud is not as dark as in the male. Abdomen of the general ground colour of the secondaries in both specimens. Beneath dull white, with a dark fuscous cloud on the upper portion of the primaries from the base to the end of the cell, and extending between veins 2 and 5 nearly to the outer margin. This cloud is darkest in the male. Expanse of both specimens 45 mm.

Described from a single pair. The male from Lethbridge, Alta., July 20th, 1915, at light, by Mr. E. H. Strickland, and loaned to the author by him, and the female taken at Calgary town lights by Mr. T. N. Willing on August 7th, 1902. The ♂ type will be placed in the collection of the Dominion Entomological Department at Ottawa, and the ♀ type is in the author's collection. Both are in fine condition, though the male lacks one antenna.



NOCTUID MOTHS FROM WESTERN CANADA.

The species is the No. 385 of my Alberta List, originally recorded as *absidum*, on the authority of Dr. Fletcher. Another specimen shown me was taken at the same time and place as the female type, and is probably in the collection of the University of Saskatchewan at Humboldt, Sask. I have also seen a female specimen taken in Calgary on August 1st, 1907, by Mr. C. G. Garrett. I am under the impression that the species has been taken by Mr. Baird at High River, where *grandis* also occasionally occurs. *Grandis* has also been taken at Lethbridge.

The male antennæ are minutely serrate-fasciculate as in *grandis*. The fore tibiæ in both specimens have two claws, one on each side of the extremity, the inner one the stronger. Nearly all my *grandis* appear to have three claws, or at any rate a claw and a very strong spine on the inner side, and a weaker claw on the outer. My only specimen of *alba* unfortunately lacks fore tibiæ. Sir George Hampson does not mention any species of the genus as possessing claws, merely stating "tibiæ strongly spined." The character may perhaps be somewhat variable, and at any rate the limit between claws and strong spines is not easily defined. The new species appears to come between *grandis* and *alba*. The former is lemon yellow with pure white secondaries, the latter pure white. My notes taken on other collections indicate that neither species is always immaculate, and though the female of *viridisparsa* has stood for many years in my collection as probably new, I have thought it best to await a better knowledge of it and other species of the genus. The receipt of the fine male from Mr. Strickland decides me that it is time the form was recognized by description. Should it ultimately prove to connect with either *grandis* or *alba*, which I think improbable, the name will still hold for it as a variety.

Euxoa thanatologia Dyar. (*Porosagrotis thanatologia* Dyar, Proc. U. S. Nat. Mus., XXVII, 833, 1904). Var. *boretha* Smith, (Journ. N. Y. Ent. Soc., XVI, 86, 1908). Var. *sordida* Smith, (Id. p. 86, seq.). All three described exclusively from specimens collected at Kaslo by Mr. Cockle.

Type form *thanatologia* Dyar. Described from a single female without abdomen. Condensed, the description reads: "Head, collar and thorax uniformly dark mouse grey

Forewings light grey basally and terminally (subterminally evidently meant, W. D.), "the whole median space blackish discoloured A black basal dash Lines not strongly defined Orbicular circular, dusky filled, reniform pale and narrowly black-ringed claviform black outlined, dark filled. Subterminal line pale with black dashes preceding it, especially at interspaces 2-4 and 5-7 Terminal space blackish like the median space." I examined the type in February, 1910, and though I was unable to match it very exactly, it very strongly suggested an intermediate form between some very pale grey, and some very dark uniform brown specimens which I had taken at Calgary. Intermediate forms between these extremes have since been bred. The condition had suggested itself to me when I saw a figure of Dyar's type in the British Museum in the previous year, and seemed quite obvious when I subsequently saw a lot of material kindly loaned me by Mr. Cockle, including another figure of the type.

Var. *boretha* Smith. Described as a species (Condensed description): "Dull smoky brown. Collar inferiorly pale; . . . the pale portion limited above by a transverse black line. Costal region more or less contrastingly paler, tending to yellowish, spots discoloured, yellowish. Cell black filled A black mark below median vein in basal space. Subterminal line of the ground colour, marked by the darker colour of the terminal space . . . preceded by a series of sagittate black marks in the interspaces. Orbicular tending to ovate, yellowish, contrasting. Reniform incompletely black margined, yellow, with smoky central line." Described from 3 ♂♂ and a ♀. Smith adds that the species appears to be allied to *terrealis*. This is explained by the fact that he had on several occasions named Calgary specimens of it "*terrealis*" for me, under which name a form of it appears in the earlier portion of my Alberta List. *Terrealis* is known to me only by the type, a ♂ from New Mexico in the Brooklyn Museum (Neumørgen collection). This has ciliate antennæ, and is referable to the *Rhizagrotis* (*Rhiacia* Hbn.) section of *Euxoa*. A figure of it is pretty well reproduced by Hampson. It is probably allied to *flavicollis* Sm., and I do not associate it with the species now under discussion, nor did I recognize it in Smith's collection. He also

suggests a resemblance to *perexcellens*, though admitting a marked difference in antennæ. The association has occasionally been made by others, with certain forms of it, but seems to me rather far-fetched.

My own notes on Smith's types say that the ♂ is "almost like some *ochrogaster*," and that the ♀, which I was able to match pretty closely, is much greyer, a fact mentioned by Smith. A few weeks later I compared my same specimen with type *thanatologia*, and more than suspected their identity. This has since been confirmed by examination of additional material, including a co-type of *boretha*, in Mr. Cockle's collection.

Var. *sordida* Smith. Also described as a species, picked out of the same lot sent him by Cockle. An extract of the description is: "Dull sordid brown, more or less shaded with black and smoky. Collar concolorous, with a black median line. . . . A diffuse black streak through basal space. Cell darker or even blackish, but not solid black filled. Subterminal line marked by a slight darkening of terminal space, and by a preceding series of black interspaceal marks. Claviform narrow, pointed. Orbicular small, round or ovate, ringed with yellowish. Reniform large, edged with black; with an inner ring of yellow scales, and the centre more or less yellowish and discoloured." Described from 1 ♂ and 5 ♀♀. He adds that the maculation is like that of some of the species of the *ochrogaster* series. With this remark I entirely agree. He states further: "It differs from *boretha* in the flattened appearance, and in the concolorous orbicular, costa and collar. It varies in the amount of overlay in the median space, one example being almost purplish black." The flattened appearance is characteristic of the female, which sex predominated amongst his specimens called *sordida*. A comparison of the types with *boretha* certainly showed some contrast in the discoidal spots, but I do not think I should ever have ventured a separation upon these characters in anything allied to an *Euxoa*. My notes say of types: "The male is near some forms of *agrestis*." I matched the ♀ type pretty closely with a Calgary ♂, which up to that time I had held as a unique, though since then I have been able to find links connecting it with the rest of my material. Mr. Cockle has

helped me liberally in this, and lent me, along with other specimens, his *sordida* ♀ co-type.

There remains yet another well-marked form of *thanatologia*, not included in any of the above descriptions, which I now describe as follows:

Var perfida, var. nov. Head, collar, thorax and primaries even dull mahogany brown. A paler shade appears at the base below the median vein, sometimes pale sienna brown, sometimes greyish ochreous. This is usually very faint, diffuse, sometimes extending to the inner margin and sometimes taking the form of an ill-defined basal streak, extending to the outer extremity of the claviform. In some specimens the cross lines are barely indicated, and are rarely very distinct. The defining geminate portions may be just perceptibly darker than the ground, but they may be traceable only by the slightly paler filling of ochreous or sienna brown. Basal half line outwardly crenate in the interspaces. T. a. line almost upright, outwardly crenate in the interspaces. T. p. line with the outer portion obsolete, inwardly crenate in the interspaces, evenly outcurved over the cell, direct from veins 3 or 2 to inner margin. S. t. line indicated by a slightly paler shade, of the same colour as the filling of the other lines and the basal shading. The veins are sometimes just perceptibly darker, and there are sometimes faintly pale intervenular streaks preceding and of the same shade as the subterminal line. Claviform faintly indicated by ochreous scales. Orbicular absolutely concolorous, round or oblique, very narrowly ringed with pale ochreous grey, incomplete superiorly. Reniform moderate, pale ochreous, incompletely paler ringed, with an irregular filling of the ground colour, which is very slightly darker inferiorly. A very fine terminal darker line occasionally present, as is also a slightly paler line at the base of the fringes, which are the least shade paler than the ground colour. Secondaries not differing at all from other named forms of the species, dull fuscous, or faintly ochreous, white, dark fuscous outwardly, fringes whitish.

The number of specimens now before me to which this description applies is ten, all females, and I have never yet seen a male approaching this form. Localities: —Alberta: Calgary (6, 1 bred);

Red Deer River, (1); High River Baird, (1). Manitoba: Miniota, Dennis, (1). B. C.: Kaslo, Cockle, (1):

Type—♀, High River, Alta., Mr. Thomas Baird. This is the darkest and most even of all the specimens, and very closely resembles Holland's plate XXIII, fig. 6, which is unquestionably this form, is probably a ♀, and may be of a Calgary specimen. I consider this the more probable, as I sent Dr. Holland a number of Calgary specimens for figuring in that work, including the present form under the name "*titubatis*" on the authority of Smith. It is the No. 224 of my Alberta List, under the name "*punctigera*," on Smith's later authority (Can. Ent., XXXVII, 54, Feb., 1905). The form has no dead black markings whatsoever, and the general colour is very even. There is no darker basal streak, no indication of darker filling either in the discoidal spots or cell, except occasionally the slight inferior darkening of the reniform, no black dashes preceding the subterminal line, and the terminal space is usually of exactly the same colour as the rest of the ground, or barely perceptibly darker. As a rule, the only real contrast is the reniform. The form is the one predominating at Calgary, very few years having passed when I have not taken at light or treacle at least a few specimens, and always females. Moreover, I have very rarely taken any other forms here, and great was my surprise when I finally traced their connection with some other forms by means of comparison of types, and breeding, and a study of Kaslo material. I have not infrequently received the form from Manitoba and Saskatchewan. It occurs also at Banff, and I am under the impression that I have seen it from Vancouver Island. A few specimens were included in the material referred to as "*punctigera*" in the Kootenai List, though the bulk of the specimens were *perfusca* Grt. (*cocklei* Sm.),* occasional forms of which are certainly not unlike it. One of my Calgary females of *perfidus* was taken by me in 1894 in cop. with a small dark red male, unfortunately rather worn, but practically indistinguishable from a small even red *ochrogaster*. For the next twenty years I never took a male at all like it which I did not feel tolerably safe in associating with *ochrogaster*, though I saw a few similar males from Saskatchewan and

*Can. Ent., XLIII, 339, Oct. 1911.

Manitoba, and have some from there now in my collection. The possibility of a mismatch by the 1894 male still rendered the association doubtful, until Mr. Tams bred similar specimens from a dark female *sordida*, some of the results of which breeding are referred to in the explanation to Plate II, given below. Its likeness to a red *ochrogaster* is so exact, that, though it well deserves a varietal name, I dare not risk description except from specimens bred from a known parent, and I have not enough of such for distribution at present.

I may summarize by briefly designating the named variations of this species as follows:

- E. thanatologia* Dyar. Light grey, median and terminal space dark mahogany brown, contrasting. Black sagittate dashes preceding the subterminal line. Known in female sex only.
- var. *boretha* Smith. Dull sienna brown, with pale collar and costa. Cell black filled, spots contrastingly pale. Sagittate s. t. dashes. As a very grey female was included under this description, the name should be considered as applying to the red-brown form only. Females of this form appear to be very rare.
- var. *sordida* Smith. Uniform dull red-brown or blackish-brown, more or less shaded with black or smoky. Cell darker or blackish. Sagittate s. t. dashes. This is a considerably darker form than *boretha*, and lacks the pale collar and costa. The great majority seen of this form have been females.
- var. *perfida* Dod. Even dark mahogany brown with a very few pale ochreous or sienna brown lines and shadings. No black markings. Orbicular and reniform pale ringed, concolorous centrally, the reniform contrasting somewhat. Known to me in the female sex only.

As each of Smith's descriptions was drawn from a series of specimens, no two of which were alike, it seems best to fix the varietal names as nearly as possible fitting the actual types.

The expanse of the species varies from 34 mm. (a captured ♂) to 43 mm., the males as a rule being the smallest. I think this is the most variable *Euxoa* known to me on this continent, with the

doubtful exceptions of *auxiliars* and *tessellata*. Mr. Cockle has shown me a specimen rather strongly divergent from any I had previously seen, though in conjunction with the rest there are indications that it probably belongs here. It is the specimen referred to as *gagates* Grt. in the Kootenai List, and bore a label on Smith's authority "*balintis*." Though it certainly suggests a dull form of the latter, I think *thanatologia* the more probable. Though I have mentioned that certain variations bear more or less resemblance to several other species, and may possibly be confused with them, the general relationship is perhaps really closer to *ochrogaster* than to any other. The wing form is very similar. In fact, as already stated, I believe males are frequently inseparable superficially, though the larvæ are very different. The male antennæ in *ochrogaster* are usually a little more strongly serrate, but this difference is not reliable. The female abdomen of *thanatologia* is, however, more depressed and laterally cylindrical. *Punctigera* has several nearer allies, though so far as it is yet known, it is a dark brown little-marked form much after the manner of *perfida*, but is a broader winged species, has rougher scaling, and lacks the depressed abdomen in the female. It should be remarked, however, that this latter character varies somewhat in any species, according to the age at death, feeding, and degree of egg development in the individual. *Titubatis* Sm. (= *intrita* Morr.) is another species having a dull mahogany, poorly-marked form, extremely like *perfida* in colour, but it has shorter and more trigonate wings, differs in details of maculation, has more quadrate thorax with heavier vestiture, and very distinctly longer serrations to male antennæ. The confusion of occasional females is quite excusable.

Dr. Dyar referred his species to *Porosagrotis* on the strength of its possessing stout tibial claws. The character is a variable one throughout *Euxoa*, and is not a reliable guide. Smith stated that the form of the male genitalia was the only character which distinguished the genus. I admit not having so far examined them, but surely a genus based on genital structure is scarcely valid. The reference to *Chorizagrotis* was based on the flattened form of the abdomen, particularly in the female, and the narrow, elongate primaries. Sir George Hampson treats the genus as a section of

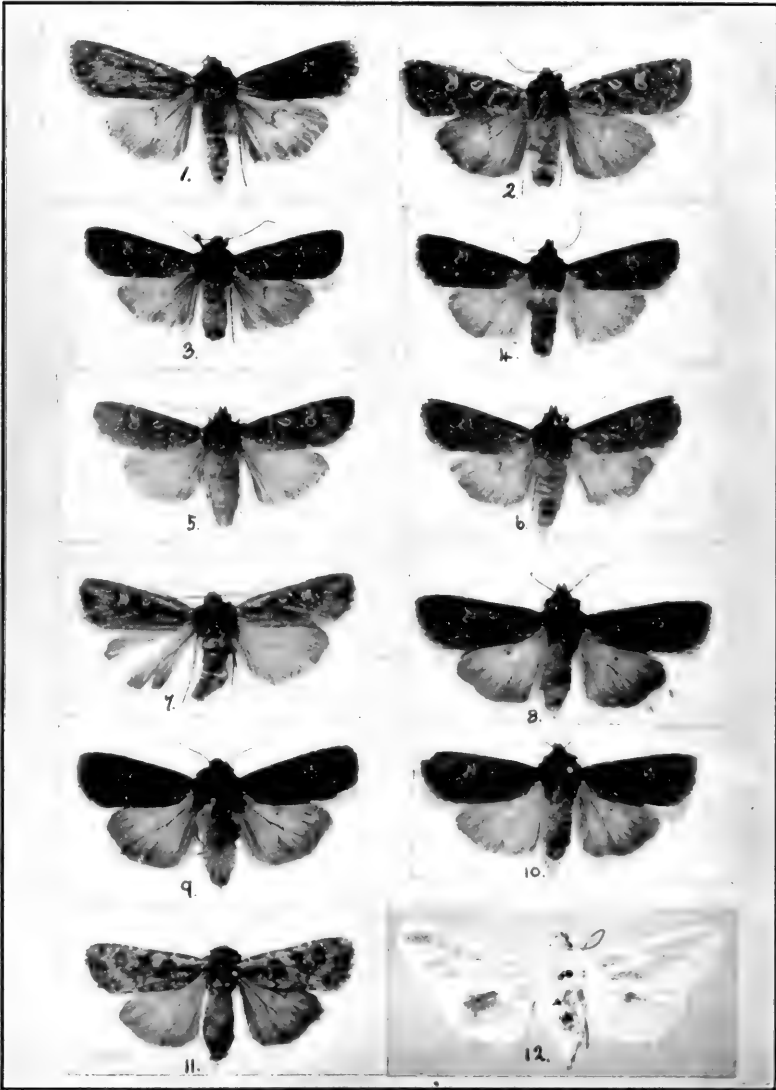
Euxoa, having male antennæ minutely serrate-fasciculate. In the present species they vary from almost simple fasciculate, to what he would call "moderately" serrate-fasciculate, variation being noticeable in specimens bred from the same female. The general rule for the ♂♂ is, however, minutely serrate-fasciculate as in *auxiliaris*.

Thanatologia flies from the latter end of June till about the middle of September. My earliest record is June 30th.

EXPLANATION OF PLATES III AND IV.

PLATE III.

- 1—*Euxoa querula* Dod, ♂ co-type. Red River, near Gleichen.
- 2— " *querula*, ♀ type. Red Deer River, near Gleichen. (Can. Ent., XLVII, 36, No. 625, Feb., 1915.) Described under *Rhizagrotis*, which is treated by Hampson as a section of *Euxoa* with ciliate male antennæ.
- 3— " *lagna* Grt, ♂. Stockton, Utah.
- 4— " *lagna* Grt., ♀. Eureka, Utah.
- 5—*Cardepiæ mutata* Dod, ♂ type. Calgary. (Can. Ent., XLV, 29, No. 299, Feb. 1913.) Described under *Mamestra*, but referred by Hampson (in litt.) as a *Cardepiæ*, very near *nova* Smith. By structural characters this reference seems correct.
- 6—*Scotogramma trifolii* Rott., var. *albifusa* Walk. ♂, Montreal (Winn.) *Trifolii* is referred to *Scotogramma* by Hampson.
- 7—*Cucullia omissa* Dod, ♂ type. Calgary.
- 8— " *asteroides* Gn., ♀. Aweme, Man. In collection of N. Criddle.
- 9— " *postera* Gn., ♀. Calgary.
- 10— " *montanæ* Grt., ♂. Calgary.
- 11— " *indicata* Sm., ♂ type. Sheep Creek, near Calgary. I have referred this name to *obscurior* Smith, and both to *floreæ* Gn. The colour is blue grey, very near that of *intermedia*.
- 12— " *similaris* Grt., ♂. Didsbury, Alta.



NOCTUID MOTHS FROM WESTERN CANADA.

PLATE IV.

- 1—*Euxoa thanatologia* Dyar, var. *sordida* Smith., ♀. Calgary. The figure is a trifle too dark. The only male I have seen as dark as this specimen was taken last summer at Lethbridge, by Mr. Strickland.
- 2— “ *thanatologia*, var. ♀. The type *thanatologia* is something between this and fig. 11. It has the basal and subterminal areas pale grey, as in 11; the median about as dark as the terminal in 2, with more and longer ante-subterminal black dashes.
- 3— “ *thanatologia*, var. ♀. Paler than No. 2 basally and subterminally, with darker median area, and median shade line.
- 4— “ *thanatologia*, var. *perfidia* Dod, ♀. The palest I have of this variety.
- 5— “ *thanatologia*, var. ♂. This is very near var. *boretha*, but lacks the pale collar and costa. The ground colour is brownish red, closely approaching the *ochrogaster*-like forms.
- 6— “ *thanatologa* var. ♂. This is a deep red form with ochreous grey ringed spots and shadings, which could very doubtfully have been distinguished from a common form of *ochrogaster* if it had not been bred with Nos. 2, 3, 4, 5 and several others, from eggs laid by No. 1. The introduction into the brood, unobserved, of the very dissimilar larva of *ochrogaster* is not in the least likely. The contrast in colour between the red of 5 and 6, and the brown of 3 and 4, is almost entirely lost in the photograph. The average size of the bred (forced) specimens is a little smaller than usual, though one characteristic of the species is its size variation.
- 7— “ *thanatologia*, var. *boretha* Smith, ♂. Kaslo (Cockle). Pale, very slightly reddish brown. A little darker and better marked only than a ♂ co-type in colln. Cockle. One of the males bred from No. 1 was almost exactly like this, but badly crippled on one side.

- 8— “ *thanatologia*, var. *sordida*, ♂. Calgary. The colour is dark red brown, and the specimen has been compared with the ♀ type, and is very like it, but the type is more ochreous, and has sharply defined s. t. dashes. It is the largest ♂ I have taken.
- 9— “ *thanatologia*, var. *perfida* ♀ type High River, Alta. (Baird.) The specimen is characterized by lack of any contrasts.
- 10— “ *thanatologia* Dyar, var. *sordida*, ♀. Calgary. Like some *perfida* in colour with the addition of numerous fine black markings. This is one of the actual specimens named “*terrealis*” for me by Smith, and referred to in my Alberta List under that name. (Can. Ent., XXXVII, 51, No. 225, Feb. 1905.)
- 11— “ *thanatologia*, var. ♀. Calgary. Rather pale grey, with black and sienna brown lines and shadings. This has been compared with the ♀ type of *boretha*, and is not unlike it, but greyer. It was also compared with type *thanatologia*. See remarks under fig. 2. The actual resemblance of No. 11 is to some forms of *auxiliaris*. I have another Calgary specimen almost exactly like it, but with longer sub-terminal black dashes. Mr. Cockle has specimens very like this.

It is strange that out of nine imagines bred from No. 1 four of them were rather sharply distinct in appearance from any previously taken at Calgary, viz., Nos. 2, 3, 5, and one like 7.

- 12—*Copablepharon viridisparva* Dod. ♂ type.

Photographs by W. H. T. Tams, by whom the bred specimens were reared.

A NEW SPECIES OF *BARYODMA*

BY THOS. L. CASEY, WASHINGTON, D. C.

Because of its apparent economic importance, I have been requested by Mr. Arthur Gibson, Chief Assistant Entomologist of the Department of Agriculture, Ottawa, Canada, to draw up a description of the following species for early publication, in order

February, 1916

that it may be referred to definitely by name in official reports. The species belongs to the *verna* group of *Baryodma*, having the mesosternal process narrow and with fine strong medial carina, and it should follow the Colorado species described by me some years ago under the name *suffusa* (Tr. Acad. Sc. St. Louis, 1906, p. 162).

***Baryodma ontarionis*, n. sp.**

Shining black throughout, the legs barely at all paler, the elytra sometimes, but not always, finely, suffusedly reddish at the apical margin internally; pubescence rather short and coarse, not at all close; head orbicular, with evident but sparse punctures, the eyes very moderate in size and not prominent; antennæ attaining the base of the prothorax, black, moderately incrassate, the outer joints transverse, the last slightly longer than the two preceding combined, the second and third rather long and subequal; prothorax nearly one-half wider than long, widest near the base, which is evenly arcuate, the sides thence feebly converging and moderately arcuate to the apex, the basal angles rounded; surface evenly and moderately convex, with small, remote and irregularly distributed punctures, more closely aggregated in two widely separated and scarcely at all impressed longitudinal lines along the middle; elytra transverse, barely wider, the suture somewhat shorter, than the prothorax, the punctures rather strong and deep, evenly and not very closely spaced; abdomen parallel, punctured nearly like the elytra, the first two tergites broadly and rather deeply impressed, the third very obsoletely, the impressions not differently sculptured; tarsi rather short, slender, piceo-rufescent. Length 2.6-4.0 mm; width 0.78-1.2 mm. Ontario (Ottawa) and Quebec (Coaticook).

This species seems to be rather common, and I have received numerous examples from Mr. Beaulne, besides the series recently sent by Mr. Gibson. It differs from *verna* and allied species in not having a well defined pale spot near the inner apical angles of the elytra, and from *suffusa*, in its black elytra, less anteriorly narrowed prothorax and more distinct elytral punctures, besides the less apically incrassate antennæ. It does not seem to resemble closely any European species known to me.

A NEW SPECIES OF CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

Catocala julietta, n. sp.

Expanse of wings three inches. Fore wings gray, a slight yellowish tinge, moderately sprinkled with brown and black scales; a heavy shade below submedian vein, continued outside the reniform to subcostal vein, reminding one of the markings of *C. pura*. Basal dash, a narrow black line reaching to the basal line; basal line heavy to subcostal vein, below this indistinct; t. a. line prominent, the lower part lost in the shade below submedian vein; median shade distinct to the upper end of reniform, from this point indistinct; reniform a pale oval with a central shade line; subreniform nearly white, slightly sordid, closed; orbicular obsolete; t. p. line single, heavy, obsolete or nearly so on costa, teeth opposite cell short as in *C. stretchii*, a pale space inside the t. p. line opposite the reniform; subterminal shade often prominent in *Catocala* rather indistinct here, brownish; a double subterminal line, the inner part less prominent than the outer, the enclosed space pale; a terminal row of intervenular lunules; fringe gray with a basal black line.

Hind wings red, of the shade found on *C. walshii* and *C. stretchii*; outer black band wide, about as in *C. walshii*, the two inner dentations near anal angle sharper than in *C. walshii*, band reaching anal angle in a line; median band a little narrower than in *C. walshii*, about as in *C. stretchii*, reaching only to submedian vein.. constricted in its middle and at bend in lower end, band not ending in a sharp point; hairs along inner margin pale smoky; apical spot very pale pink, intervenular points next to the fringe the same, shade, small; fringe white.

The under side similar to its allies, a little more gray on apex of fore wings.

One male, captured in woods near Carbondale, August 23, 1915, by Miss Juliette Hanford, to whom I have dedicated the species. The specimen is in the cabinet of the writer.

While differing in the markings of the fore wings, yet the size, tint of gray and colour and markings of hind wings, would place this species near *C. walshii* in our lists.

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FRANCIS MARION WEBSTER.

Canadian Entomologists had long regarded Mr. F. M. Webster as one of themselves, and the mutual warm friendship and sympathy grew with years. His sudden death in Columbus, Ohio, on January 2nd came, therefore, as a shock to those of us who enjoyed his friendship and benefited by his ripe experience. It was my good fortune to sit with him during the joint "smoker" of the Association of Economic Entomologists and the Entomological Society of America at Columbus, Ohio, after my address on the evening of December 29th, and he left me, laughing in his usual happy manner, to retire for the night. A few hours later pneumonia suddenly developed, and it ran a fatal course with astonishing rapidity.

Although he was born in 1849, in Lebanon, N. H., and had led a strenuous life, his mind was active, his zeal for the extension of his work was stimulating and his broad grasp of the details of his work was undiminished. He belonged to, and was one of, the most worthy of that splendid class of older workers in economic entomology to whom our science owes so much, both by their example and by the thorough character of much of the work they have bequeathed to us.

His first official position was that of Assistant State Entomologist of Illinois in 1882, and he brought with him the rich experience of a keen observer and a practical agriculturist, a mental equipment which always impressed itself upon the character of his subsequent work. From 1884 to 1892 he served as special field agent to the United States Department of Agriculture, and it was largely while working in this capacity that a large part of his best original work was effected. From 1886 to 1890 he was engaged on his well-known investigations in the valley of the lower Mississippi River on the buffalo gnats and their suppression. In 1888 he visited Australia in company with Koeble, who was seeking the natural enemies of the citrus fluted scale, and he also paid visits to Tasmania and New Zealand. His work on the

Hessian Fly and other insects affecting field crops, which established so securely his reputation as an investigator and as an authority on this group of insect pests, was carried out mainly during the years 1891 to 1902, when he held the position of Entomologist to the Ohio State Experiment Station. During 1903-04 he was attached to the Biological Survey of Illinois.

After so many years of fruitful preparation he went to Washington and joined the Bureau of Entomology of the United States Department of Agriculture in 1904, and two years later the section of Cereal and Forage Insect Investigations was created and he was given charge of that important section of the activities of the Bureau. From a single assistant his staff increased to more than fifty trained men, and the last appropriation for his work (1915-16) amounted to \$114,500, figures that indicate the zeal with which he devoted himself to his work. He was one of the first to recognise the importance of the establishment of field stations, and at the time of his death he was directing the work of about eighteen such stations in the different States of the Union.

His connection with Canadian entomology was a long and valuable one. The October number of THE CANADIAN ENTOMOLOGIST of 1888 contained his first contribution—a very characteristic letter—his last appeared a week or two before his death. He was elected an Honorary Member of the Entomological Society of Ontario in 1899, and his connection with the Society was one of which he always spoke with pride and genuine comradeship, for it meant an additional bond with some of his best friends. We shall always remember the pleasure of his company and the practical address he gave at the Jubilee Meeting of our Society in 1912, his last visit to Canada. In our work we shall miss his counsel and co-operation, but we shall be stimulated by his example, and he will always be remembered as one who was ever ready to assist and whom we counted it as a privilege to number among ourselves.

C. GORDON HEWITT.

POPULAR AND PRACTICAL ENTOMOLOGY.

ERADICATION OF THE BEDBUG BY SUPERHEATING.

BY W. A. ROSS, FIELD OFFICER, DOMINION ENTOMOLOGICAL
LABORATORY, VINELAND STATION, ONT.

Our experience with superheating as an effective method of controlling the Mediterranean Flour Moth (*Ephestia kuehniella*)

March, 1916

led us to believe that the same measure would prove to be a specific for the Bedbug (*Cimex lectularius*) and other household insects. In the month of July, 1914, we had an opportunity of testing this likely remedy in a boarding-house, badly infested with *Cimex*, and the results came up to our best expectations.

The house was an eight-roomed, two-storey frame building, situated near Vineland, Ontario, and was furnished with iron and wooden bedsteads, varnished dressing tables, plain and varnished tables, chairs and the usual bric-a-brac. The heating system consisted of a hot-air furnace in the basement, with shafts leading into all the rooms, and a kitchen stove and parlour heater on the first flat.

The fires were started at 9.30 a.m., thermometers were placed in different parts of the house and the temperatures were noted every hour. The following table shows a record of the temperatures in three of the bedrooms on the upper storey:

Time	No. 3	No. 4	No. 5
9.30	78 F.	77 F.	78 F.
10.30	94	82	92
11.30	104	95	102
12.30	114	99	117
1.30	130	109	126
2.30	138	115	136
3.30	146	122	142
4.30	148	127	148
5.30	152	138	149
6.30	162	140	158
7.00	160	140	154
7.30	159	140	153

Outside temperatures: Maximum, 73 F. Minimum 64 F.

Thermometers: No. 3—On wall in 1st infested bedroom.

No. 4—On bed in 2nd infested bedroom.

No. 5—On wall in 3rd infested bedroom.

At 1.30 p.m. many of the adults and nymphs had succumbed, and by 4.30 p.m. they were all dead. However, the heating was not discontinued at this point, but was prolonged until 7.30 p.m. because it was considered probable that it would take a longer

exposure to destroy the eggs. The results obtained from this treatment were very gratifying—the bedbugs in all stages were wholly eradicated and the house furniture was not damaged in the slightest degree.

It is more than probable that the above noted temperatures were unnecessarily high, and that the superheating would have been equally effective if the temperature had been maintained between 120 F. and 130 F.

SUNFLOWER INSECTS IN CALIFORNIA AND SOUTH AFRICA.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

On August 16th, 1915, I had an opportunity to collect and study the insects on *Helianthus lenticularis*, the common wild sunflower, at Orange, California. The plants grow commonly by the roadside, where, at this season of the year, they are practically the only wild flowers to be seen. I was unable to find any characters on which to separate the Californian Sunflower from that of Colorado. There was a good deal of variability, thus three plants growing close together showed:

(a). Rays 20, short and broad, obtuse, 34 mm. long, 14 broad, light orange, suffusedly deeper basally.

(b). Rays 21, acute, 29 mm. long, 7.5 broad, coloured nearly as in a.

(c). Rays 18, long, length 40 mm., width 9.5, entirely uniform deep orange. No wild *H. lenticularis* was noticed between San Francisco and Santa Barbara, but the plant was abundant by roadsides in the region round Los Angeles, and also about cultivated fields in the San Diego region.

The object of my investigations was in part to determine, if possible, whether *H. lenticularis* was really a native of California. On reviewing the insect fauna, it appears to show less special adaptation than that on the Rocky Mountain sunflowers, and tends to support the view that the species has been introduced.

The sunflower fauna at Orange, as obtained on August 16th was as follows:

Hymenoptera

Halictus armaticeps Cresson. Six females, collecting pollen.

Halictus nevadensis Crawford. Three females.

March, 1916

Halictus helianthi, n. sp. One female.

Length about 4 mm., anterior wing 3 mm.; head and thorax dark green, abdomen and legs piceous; hind margins of abdominal segments obscurely reddish; pubescence dull white; wings hyaline, iridescent, nervures and stigma testaceous. Head ordinary; eyes converging below; mandibles dark ferruginous, black at base; antennæ dark, flagellum obscurely reddened beneath apically; tegulæ piceous, strongly punctured; mesothorax dullish, finely and distinctly punctured; area of metathorax delicately sculptured.

Microscopic characters: Front densely punctured; a delicate keel between antennæ; tegulæ well punctured; mesothorax reticulated between the punctures, which are well separated on disc; area of metathorax with few, delicately wrinkled plicæ, on a minutely reticulate surface, and with no sharp or shining edge posteriorly; scutellum rather sparsely punctured; abdomen with very minute scattered punctures, close to *H. perparvus* Ellis from Arizona, but *perparvus* differs thus: Mesonotum yellow-green, contrasting with the dark blue-green of rest of thorax (in *helianthi* no marked contrast; mesothorax is an obscure olive green); second and third abdominal segments not, or not noticeably, punctured (in *helianthi* very distinctly punctured in the sub-basal region, where the pigmentation is strongest); plicæ of area of metathorax of same general type, but larger and more numerous, and the minute reticulation is stronger and yet more minute, producing the appearance of a very finely malleate surface (in *helianthi*, especially apically, there are very delicate mainly transverse lines); plumose hairs on posterior face of metathorax shorter. (The nearest relative in Southern California is *H. tegulariformis* Crawf., which I took at La Jolla in August; this is larger than *helianthi* and has the mesothorax brighter, yellowish green.)

Agapostemon texanus Cresson. Two females.

Melissodes aurigenia Cresson. One female, collecting pollen; 7 males, three of them denuded.

Pseudomelecta californica Cresson. One female.

Diadasia enavata Cresson. One female, collecting pollen.

The absence of any species of *Andrena* and *Megachile* is noteworthy. A single *Bombus* was seen on the flowers, but not captured. No honey-bees were on the flowers, though they were in the vicinity.

Small Torymids were present; one had been captured by a Thomisid spider.

COLEOPTERA.

Desmoris constrictus Say. Grey sunflower weevils were in some numbers; I did not feel sure on casual inspection that they were identical with our Colorado *D. constrictus*, but Mr. H. C. Fall kindly informs me that they belong to that species.

A single *Diabrotica* was seen.

LEPIDOPTERA.

Eupithecia sp. Small yellow geometrid larvæ were common on the flower heads, feeding on the rays, which they resembled in colour. I bred from one of them a small *Eupithecia*, not yet determined. This is the best example of a specially adapted insect apparently peculiar to the Pacific Coast region, in the series. It may however, have lived originally on one of the native yellow-rayed compositæ.

A single *Pyrameis* was seen on the flowers, but no other butterflies.

HEMIPTERA.

Acholla tabida Stal. Common; one had captured a small *Halictus*.

Determined with the aid of advice from Dr. Van Duzee.

Lygus pratensis L. One.

The absence of *Phymata* was noteworthy.

An aphid of the genus *Macrosiphum* was abundant on the sunflowers in one place. I referred specimens to the University of California, and Mr. Swain, who examined them, considers them "nearest to *M. sonchi* L." They are, however, certainly not *M. sonchi*. *Chrysopa* eggs were found on the aphid-infested plants.

ARACHNIDA.

Spiders, which were numerous on the flowers, included the following, kindly determined by Dr. N. Banks:

Icius vitis Cockerell (Attidæ). Common.

Chiracanthium inclusum Hentz (Clubionidæ).

Tetragnatha laboriosa Hentz. (Tetragnathidæ.)

Runcinia aleatoria Hentz (Thomisidæ.)

Misumana diegoi Keyserling (Thomisidæ.)

The last is a special Californian form, represented, however, by a similar species in Colorado. The first is very widely dis-

tributed in the west; the others are common species of wide range over North America.

In addition to the above, I obtained some small Hymenoptera, etc., which I have not yet tried to determine.

SUNFLOWER INSECTS IN THE TRANSVAAL.

Mr. J. Burt-Davy has been growing the red sunflowers (*H. annuus coronatus*) at Burttholm, Vereeniging, Transvaal, and has found the following lepidopterous visitors to the flower-heads, the first three being the most frequent. I give in brackets the nomenclature of recent revisions:

Plusia orichalcea (*Phytometra orichalcea* Fabricius).

Plusia chalcites (*Phytometra chalcytes* Esper.).

Melicleptria armigera (*Chloridea obsoleta* Fabricius).

Plusia exquisita (*Phytometra exquisita* Felder).

Plusia oxygramma (possibly *Phytometra albostrigata* Brem. & Gr.; true *oxygramma* is American).

Zinckenia fascialis (*Hymenia fascialis* Cramer).

Audea catocala (*Ulothrichopus catocala* Felder).

Empusada chrysota Hampson.

Coradrena sp.

Thus it appears that in S. Africa sunflowers attract *Plusiines* exactly as they do in this country.

TWO LOCALITY CORRECTIONS.

In the Canadian Entomologist, October, 1915, pp. 329 and 331, Dr. Dietz described two new species of Tipulidæ, which we had sent to him, viz., *Limnobia gracilis* and *Dicranomyia aquita*, the localities given being "Tsolinoi Lake—about five miles north of Athabaska Lake—July 5th, 1914 (F. Harper) and "Fort Resolution, August 24th, 1914 (F. Harper.)" I have been recently informed by Mr. Harper, who collected the specimens, that the localities should be changed to read as follows:

Limnobia gracilis—Tsal-Wor Lake, Saskatchewan, about eight miles from the north shore of Lake Athabaska, at a point midway of its length.

Dicranomyia aquita—District of Mackenzie, along the south shore of Great Slave Lake.

ARTHUR GIBSON,
Department of Agriculture, Ottawa, Ont.

THE STONEFLIES OF THE GENUS PELTOPERLA.

BY JAMES G. NEEDHAM AND LUCY W. SMITH, ITHACA, N. Y.

This obscure genus of stone-flies is of wide distribution in North America, and it includes a considerable number of species, only two of which have hitherto been made known. The type species *P. arcuata* was described by the senior author in 1899 in the *Proceedings of the Biological Society of Washington*. However, specimens of both adult and larva of this species had long reposed in the Cornell University collection. In 1907 Nathan Banks described a second species, *P. minor*, from British Columbia. In 1912, Professor H. Garman published an excellent figure of a nymph belonging in this genus in Bulletin No. 159 of the Kentucky Agricultural Experiment Station. This specimen was from a rill flowing into Straight Creek near Cary, Kentucky, and was labelled "An Undetermined Stonefly nymph, (No. 3)."

Meanwhile specimens for study have been coming into our hands from various quarters: from Ramapo, N. Y., contributed by Mr. William T. Davis; from Black Mts, N. Carolina, loaned by Mr. William Beutenmuller; from several localities in Georgia, collected by Dr. J. C. Bradley; from Nevada, loaned from the Museum of Comparative Zoology by the curator, Mr. Samuel Henshaw. There are also a few specimens bearing only general locality designation from unknown sources in the Cornell University collections, and along with these a few nymphs from British Columbia, from California, from Arizona, and from Washington, D. C. One species, described below as *P. maria*, from Pelham, Mass., has been collected and reared by the junior author. No good characters have as yet been discovered for distinguishing this nymph from that of *P. arcuata*, or from those of the other species which have not as yet been reared. This paper will therefore be limited to characterization of the adult forms.

Soft-bodied stoneflies such as these make very unsatisfactory pinned specimens. They shrivel like prunes in drying, and, as a rule, the best differential characters offered by the genitalia may be made out only by boiling and softening and expanding the specimens. The colours fade hopelessly, either pinned or in alcohol. Our descriptions of colour will therefore be useful only in so far

as they indicate general distribution of the deeper pigmentation areas. What is described from pickled or mummified specimens as yellow may have been green in life.

This genus includes species varying from 10 mm. to 20 mm. in length, and from 18 mm. to 50 mm. in expanse of wings. It is characterized by the possession of but two ocelli, by having a broadly depressed body, short head retracted under the front of a wide prothorax, long antennæ, and very short caudal filaments that are often hardly longer than the abdomen is wide. The venation of the wings is characterized by numerous costal cross-veins, a short sub-costal vein, not reaching the level of the cord, and the branches of the vein Cu 1 appear to spring from its anterior side.

Nymphs of this genus, so far as observed hitherto, live in spring-fed rivulets under stones. About Ithaca, N. Y., they are not uncommon in such places, and they are abundant in a small southern tributary to Enfield Creek near the mouth of the gorge. The nymphs are unique in form, having a wide thorax, broadly rounded and covered with an appressed pubescence above. The abdomen is narrower and rather short. A few long tapering gill filaments protrude backward singly about the base of the legs, both dorsally and ventrally.

Nine species are here described, of which seven are believed to be new. Only the adults are characterized, and, unfortunately, but one sex is known as yet in the case of several of the species. The accompanying plate will doubtless serve better than the descriptions for distinguishing the species. The drawings of genitalia and of the disc of the prothorax have all been done on uniform scale. They are the work of the junior author.

Two very distinct types of male genitalia occur in this genus. One is represented only by a new species from Nevada, *Peltoperla thyra*. In this, the 9th abdominal segment is abbreviated almost to complete disappearance on the mid-dorsal line; the mid-ventral callosity is a mere crescentic transverse ridge at the base of a deep V-shaped suture, the supra-anal plate is remarkably hypertrophied, elevated, bent forward in the middle, and armed with a pair of lateral expansions beside its knobbed tip (Fig. 14). In the other group, represented by all the other species of which

males are known (Figs. 5, 8 and 11) the 9th abdominal segment is prolonged on the mid-dorsal line; its mid-ventral callosity is elevated on a clavate pedicel; the supra-anal is rudimentary, and the subanal plates are developed as a pair of upcurving hooks, whose tips meet the prolongation of the tergum of the 9th segment.

These differences are so remarkable that in any other order of insects they would doubtless be used to distinguish genera; but here they appear not to be accompanied by corresponding differences in other parts and we must agree with Enderlein that the remarkable differences in secondary sexual characters often found in a series of species of Plecoptera, otherwise uniform, are probably not of generic significance.

There are slight venational differences between species, in the number of cross-veins in certain areas, and in the number of terminal forks of veins Rs and Cu, but in absence of a considerable series of specimens, we have no means of knowing how constant are the apparent differences, and our experience with such characters in this order leave us little confidence in their reliability. *Pelto-perla brevis* appears, however, to be the only species in which the radial sector is but once forked beyond the cord. The differences in the form of the apex of the 8th ventral segment in the female is probably the most available criterion of the remaining species. *Pelto-perla anna* is the only species which shows no appreciable prolongation of the apex of this sternite: *P. dorothea*, *P. ada* and *P. arcuata* have it successively more prolonged and entire; *P. maria*, *P. cornelia* and *P. cora* have it successively prolonged and with a wide median notch.

The two species hitherto made known are not here redescribed but new figures of them are given in the accompanying plate.

DESCRIPTION OF NEW SPECIES.

***Pelto-perla maria*, n. sp.**

Length of female 16 mm.; expands 27 mm.

Colour brownish, darker on the sides of the thorax and apex of the abdomen. Head yellowish with a diffused brownish blotch on the disc in front of the ocelli. Antennæ yellowish, paler for a distance beyond the two basal segments, which are thick and brownish. Wings yellow hyaline with brownish veins.

There are some 14 cross-veins in the costal space before the end of the subcosta, and seven beyond. The cross-veins in the median and cubital areas are 5 and 7 respectively. Legs yellowish brown, not distinctly bicoloured; 8th ventral segment of the female slightly produced and broadly emarginate in the middle by a shallow wide notch.

Type—A female in the Cornell University collection from Pelham, Mass., reared on the 20th of May, 1913, by the junior author.

***Peltoperla anna*, n. sp.**

Length of male 13 to 14 mm.; expands 23 mm. Length of female 20 mm.; expands 27 mm.

A yellowish species (possibly greenish in life), having inter-segmental darker areas about the bases of the legs and on the sides of the thorax. Head yellow. Antennæ yellowish, slightly darker on the pedicel and on the apical half. Prothorax with pale brown marks just before the middle of the disc and a transverse brownish crescent close to the rear margin. Legs yellow, with a knee-cap of brownish-yellow on the base of the tibia externally, and the tips of the tarsi also brownish. Abdomen yellow, with broad, half-rings of brown margining the ventral segments. A pair of large, brownish blotches almost covers the 9th segment ventrally and the tips of the subanal plates are suffused with brown. Wings yellowish hyaline, with the veins darker.

The 8th ventral segment of the female shows in this species no elongations. The plate is cut squarely across the margin, and scarcely differs in appearance from that of adjacent segments. At the base of the 9th ventral segment of the male, there is a chitinated knob supported upon a short pedicel directed backward. The apex of this segment is slightly produced upward in the rear and covers the bases of the enlarged subanal plates, which are pointed, and reach with their tips the level of the dorsum of the segment. Caudal appendages short, abruptly tapering; each of the segments beyond the 4th basal bears a single, stout, downwardly directed seta.

Types—Male and female, in the Cornell University collection were collected at Burton, Ga., (altitude 1800 feet), on May 21st, 1911, by Dr. J. Chester Bradley.

***Peltoperla cornelia*, n. sp.**

Length of female 18 mm.; expands 30 mm.

Colour brownish-yellow. Head yellow, except for an obscure brownish diffused spot before and between the ocelli. Disc of prothorax pale brownish, obscurely and coarsely rugose. Legs yellowish, with the sides of the femora brown. A dark basal knee-cap covers the tibiae, with apices of tibiae and all of the tarsi brown. Abdomen entirely yellow. Wings smoky-yellowish, the veins brown, costal cross-veins closely crowded, there being about 15 before the end of the subcosta and 8 beyond.

The 8th ventral segment of the femora, produced backward to cover about half of the 9th segment, broadly rounded on the sides and very broadly emarginate in the middle, and a wide notch that is hardly more than an undulation of the margin.

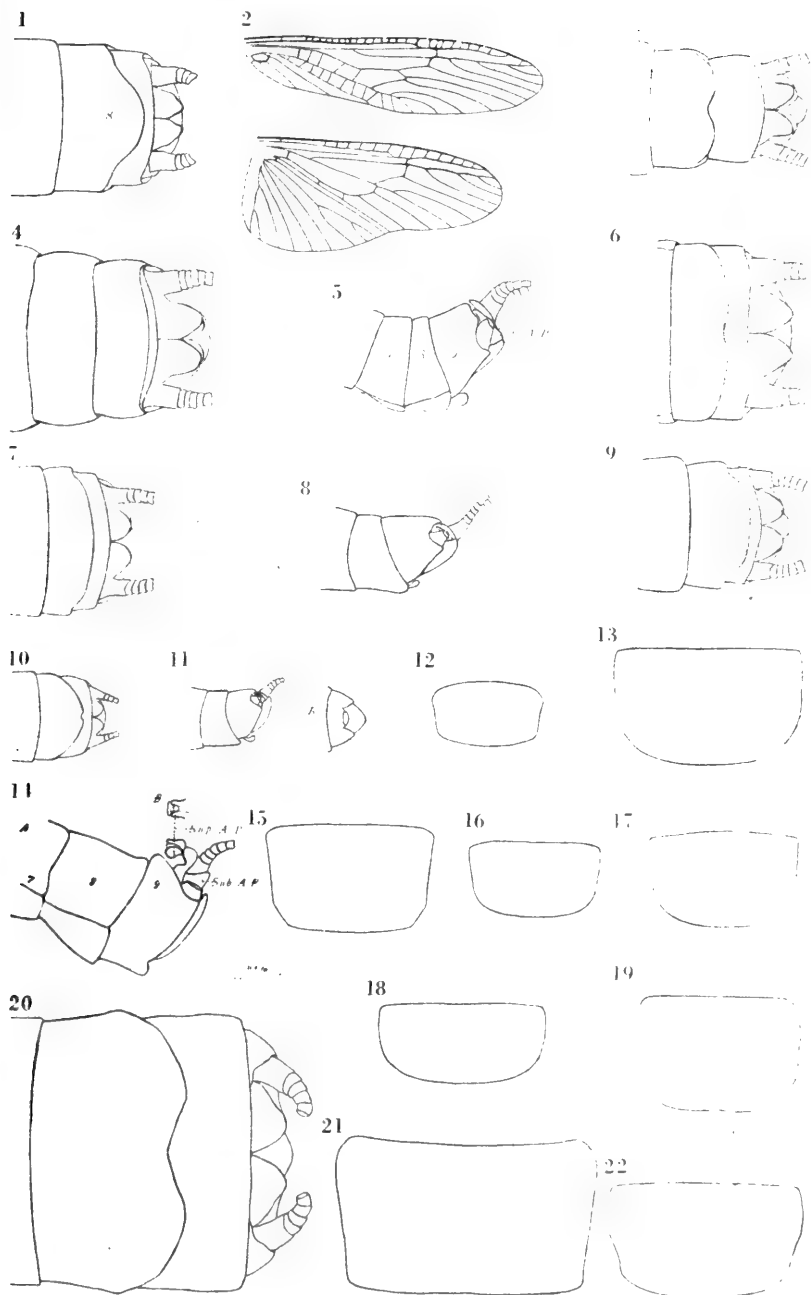
Type—A single female collected at Cornelia, Georgia, on the 5th of April, 1906 (possibly the 4th of May, the label bearing the designation, "5-4").

***Peltoperla dorothea* n. sp.**

Length of male 14 mm.; expands 21 to 28. Length of female 17 mm.; expands 28 to 30.

Colour, pale brownish. Head yellowish, except for a broadly diffused band between the eyes before and between the ocelli. The ocelli are somewhat nearer to the eyes than to each other. Antennae brownish and distinctly yellowish basally just beyond the 2nd segment. Prothorax, nearly straight across the front margin, with nearly parallel sides and very broadly rounded hind margin. Angles all obtuse. Rugosity upon the discs few, irregular, and somewhat paler. Thorax and abdomen brownish on the sides, yellow below. Wings smoky-hyaline, with brown veins. Setae yellow, slightly darker on the tip, densely clothed with yellowish hair and bearing beneath a line of long, stout spines, one on each segment.

The 9th ventral segment of the male bears a conspicuous knob upon a stalk that rises from the extreme base of the segment. The apical border is upturned, partly covering the bases of the sub-anal hooks, which are up-curved, parallel and sharp-pointed, and reach to the rear of the dorsal segment. The 8th ventral segment of the female is entire and moderately produced into a



THE GENUS PELTOPERLA.

broadly-rounded lobe which covers nearly the entire width of the 9th segment, but only the basal third of its length.

The male type is from Ramapo, New York, collected on the 31st of May by Mr. William T. Davis. The female type is in the American Museum of Natural History, and was collected by Mr. William Beutenmuller in the Black Mountains of North Carolina in May. There are several male and female co-types collected at the same time and place by Mr. Beutenmuller.

***Peltoperla ada*, n. sp.**

Length of female, 14 mm.; expands 24 mm.

A slender yellow species. Head wholly yellow. Antennæ yellow at the base, growing somewhat darker beyond the basal third. Prothorax yellow, with indistinct, embossed markings on the disc, shorter than usual, its length being about half its width. Front border nearly straight, sides converging posteriorly, a little border around hind margin. Legs pale yellowish, excepting the extreme tips of the tarsi, which are darker. Abdomen and setæ yellow. The 8th ventral segment of the female produced backward in a broadly rounded entire lobe, which covers two-thirds of the 9th segment.

Type—One female specimen in the Cornell University collection, collected at Black Rock Mountain, Ga., May 24, 1911, by Dr. J. Chester Bradley.

***Peltoperla cora*, n. sp.**

Length of female 28 mm, expands 50 mm.

Yellowish brown. Top of head wholly yellow. Distance between ocelli about one-half distance from ocellus to eye. Antennæ pale brown, base pale yellow. Prothorax concave in front, bulging at sides, slightly narrowed posteriorly with obtuse hind angles, hind border straight across middle, sloping backward at sides; length little more than one-half width; margins strongly flaring; disc concolorous, obscurely and sparsely rugose.

Legs mostly brown, tarsi wholly so; femora and tibiæ paler on the sides with margins brown, darker externally.

Abdomen brownish, yellow below, excepting the immense ventral plate of the 8th segment, which almost covers the 9th segment. It is very broad, with wide and shallow apical emargina-

tion. Setæ brown, with yellowish bases, very short and abruptly tapering.

Type—A single female from Reno, Nevada, in the Museum of Comparative Zoology.

***Peltoperla thyra*, n. sp.**

Length of male 18 mm.; expands 30 mm.

Colour yellowish brown. Head obscure, but a little darker around the ocelli. Prothorax nearly uniform yellowish brown, faintly rugose, somewhat more squarely angled than in the other species, though like the others narrowed posteriorly and somewhat rounded behind. Legs yellow, with tips of tibiae and tarsi darker. Wings yellowish-hyaline; veins amber-brown; abdomen yellowish, with the apical segments much darker. Setæ yellowish basally, darker towards the apex.

The 9th ventral segment is divided by a U-shaped suture, which separates off the upturned posterior lobe from the basal part of the segment, and just before the suture on the mid-ventral line there is a broad, chitinous callosity that is very different from the knob of the males of the other two species above described. It is not elevated upon a stalk, but merely caps the mid-ventral portion of the hind margin of this basal half of the sternum of the 9th segment. On the dorsal side the 9th segment is broadly excavated on its hind margin, a wide V-shaped notch almost dividing it in two in the median line. The edges of the V are upturned and chitinized. The 10th segment is not visible externally, reduced to a very narrow, thinly chitinized ring that is somewhat wider below. Supra-anal plate remarkably developed, broadened upward, and then recurved forward at its tip, knobbed at the end and bearing two thinner, wing-like appendages at its sides. The median terminal knob is beset with backwardly curved prickles.

The ventral callosity of the 9th segment is crescentic in outline when viewed from below. Within the apex of the 9th segment there are visible a pair of chitinized appendages, the nature of which is unknown. They are divergent basally, parallel and approximate at their tips, and possibly are in the nature of copulatory organs.

Type—Single male specimen from Nevada in the Cornell University collection.

EXPLANATIONS OF PLATE V.

Fig. 1. *Peltopterla arcuata* Needham.—End of abdomen of ♀ adult in ventral view.

Fig. 2. *Peltopterla arcuata* Needham.—Wings.

Fig. 3. *Peltopterla maria*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 4. *Peltopterla anna*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 5. *Peltopterla anna*, n. sp.—End of abdomen of ♂ in left lateral view.

Fig. 6. *Peltopterla cornelia*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 7. *Peltopterla dorothea*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 8. *Peltopterla dorothea*, n. sp.—End of abdomen of ♂ in left lateral view.

Fig. 9. *Peltopterla ada*, n. sp.—End of abdomen of ♀ in ventral view.

Fig. 10. *Peltopterla brevis* Banks.—End of abdomen of ♀ in ventral view.

Fig. 11a. *Peltopterla brevis* Banks.—End of abdomen of ♂ in left lateral view.

Fig. 11b. *Peltopterla brevis* Banks.—Ninth sternite of ♂ showing median callosity.

Fig. 12. *Peltopterla brevis* Banks.—Outline of prothorax.

Fig. 13. *Peltopterla arcuata* Needham.—Outline of prothorax.

Fig. 14a. *Peltopterla thyra* —End of abdomen of male in left lateral view.

Fig. 14b. *Peltopterla thyra*.—Extremity of supra-anal plate, viewed from behind.

Fig. 15. *Peltopterla thyra* —Outline of prothorax.

Fig. 16. *Peltopterla ada*.—Outline of prothorax.

Fig. 17. *Peltopterla dorothea*.—Outline of prothorax.

Fig. 18. *Peltopterla maria*.—Outline of prothorax.

Fig. 19. *Peltopterla anna*.—Outline of prothorax.

Fig. 20. *Peltopterla cora*.—End of abdomen of female in ventral view.

Fig. 21. *Peltopterla cora* —Outline of prothorax.

Fig. 22. *Peltopterla cornelia*.—Outline of prothorax.

NOTE ON AN INTERESTING CASE OF TWO GENERATIONS OF A PARASITE REARED FROM THE SAME INDIVIDUAL HOST.

BY P. H. TIMBERLAKE, U. S. DEPT. AGRICULTURE, BUREAU OF ENTOMOLOGY, CEREAL AND FORAGE INSECT INVESTIGATIONS.

In the course of investigations of *Dinocampus americanus* (Riley), a common Braconid parasite of many of the larger species of Coccinellids, conducted in relation to cereal and forage crop insects, several interesting features have developed, not the least important of which is the discovery that parasitism is not invariably fatal to the beetles.

On September 5th, 1914, a beetle of *Hippodamia convergens* in one of the writer's experiments was found giving issue to a parasite which in due course of time spun its cocoon beneath the host. The beetle, a large vigorous female behaved in the usual manner of parasitized specimens, clinging tenaciously to the cocoon and remaining in a comatose condition for several days. On the seventeenth of the same month it was found wandering about the vial rather feebly, but of its own volition, as if in search of food, having recovered to a large extent from its lethargy. The beetle consequently was fed with aphids and was seen to eat freely. Within a few days it largely recovered its strength, seemed to be perfectly healthy and ate freely whenever fed. On the eighth of October, however, it was found in a weak condition and died shortly afterward, having fallen a victim apparently to a common disease of Coccinellids, which in its manifestations is somewhat similar to the wilt disease of caterpillars. The beetle subsequently was subjected to a thorough examination and dissection. The wound on the dorsal side of the abdomen at the apex through which the parasite had escaped was found completely healed over by the deposition of black, chitinous matter. The ovaries were developed considerably more than they could have been when the parasite issued, although far from producing eggs, and in the abdominal cavity the molt skin of the first stage larva was found.

In the meantime out of a few beetles of the same species collected on September 22nd and 23rd at Salt Lake City, Utah, one

March, 1916

male on dissection was found to contain the remains of a first stage larva of the parasite. The remains, consisting of the chitinized parts of the head, were either a molt skin or less probably what was left of a larva that had died for some unaccountable reason long previously. Although it did not occur to the writer to examine the abdomen of the beetle for evidence of the wound through which the full-grown larva possibly had escaped, yet the evidence, if not complete, was in favor of the theory that the host under normal conditions in the field had recovered after becoming a victim of the parasite.

During the past season further observations to the same effect have been made. In a letter to the writer Mr. Harrison E. Smith cites the case of a beetle of *Coccinella 9-notata* collected at Agawam, Mass., which under his observations fully recovered from the effects of parasitism and lived at least six weeks after the parasite had issued from its body. In a long series of experiments with about twenty different hosts, the writer also found that beetles of *Olla abdominalis* in five out of nine cases observed fully recovered within a few days after the larva of the parasite had made its escape. Such beetles failed to become palsied and wandered away from the cocoon, even before the construction of the latter was fairly under way. One beetle, a female, was noted to be exceptionally active just after the parasite had issued and ran about the vial as if nothing had happened. This female having been mated in the meantime, began to deposit eggs after an interval of twenty-two days.

It occurred to the writer that it ought to be possible to rear a second generation of the parasite from these beetles, and the experiment was tried out, consequently, with entire success in two cases. The complete data of one of these experiments are as follows:

August 2nd—♂ *Olla abdominalis*, reared from stock collected at Brownsville, Texas (M. M. High).

August 5th—Beetle exposed to parasite, the fourth generation originally from *Hippodamia convergens*, collected in Humboldt Canyon, California (received from Harry S. Smith).

August 25th—Cocoon of parasite found, the beetle active.

August 30th—♀ *Dinocampus* issued from cocoon.

September 12th—Beetle re-exposed to the parasite that issued from it.

November 4th—Second cocoon found.

November 10th—Beetle found dead. Dissection gave proof of successive parasitism.

November 17th—♀ *Dinocampus* issued from second cocoon.

These observations show conclusively that this particular parasite does not injure the vital organs of the host in the least. In the great majority of cases, however, the fatty lymph tissues of the host are left in such a depleted condition that the beetle soon dies, and the wound through which the parasite escapes in itself probably would be fatal in most instances. It is only the exceptionally vigorous beetles which recover. The observations also illustrate an adaptation of parasite to host rarely seen in such perfection elsewhere. Many of the parasites of homopterous insects do not kill their hosts until the latter in part at least have fulfilled their reproductive functions, but here we find a condition still more favorable to host and parasite alike, in which the host ultimately is left uninjured and free to reproduce its kind.

A NEW GENUS AND SPECIES OF NITIDULINI, WITH DESCRIPTIONS OF OTHER NEW SPECIES OF COLEOPTERA FROM INDIANA AND FLORIDA.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among the Coleoptera collected during the last two winters in Florida are a number of species which I am not able to identify from the literature extant. As I was making a trip to Cambridge, Philadelphia and Washington last August to study the types of certain Rhynchophora in the LeConte, Horn, and other Collections. I took some of these Florida species with me, and could find nothing similar to several of them in any of the collections. To Dr. E. A. Schwarz, of Washington, D. C., and Chas. W. Leng, of New York City, I am under obligations for aid in making the comparisons and for their opinions regarding the status of the species described below.

March, 1916

Family NITIDULIDÆ.

Quadrifrons, gen. nov.

Labrum small, its front edge broadly rounded, not emarginate. Front projecting abruptly from head, subquadrate, its sides parallel. Last joint of maxillary palpi oblong-cylindrical. Head without antennal grooves. Antennæ reaching middle of thorax, first joint robust, obconical, second oval, one-half length of third, which is slender and clavate; 4—8 short, as wide as long, closely united; club large, subglobose. 3-jointed, the sutures distinct, the two basal joints subequal, strongly transverse, the last joint obtusely conical, smaller but distinct. Eyes small, very prominent, coarsely granulated. Prosternal spine prolonged and convex between the coxæ, then abruptly bent downward; mesosternum not carinate. Front tibiæ with outer apical angle greatly prolonged in the form of a large triangular tooth, the outer sharp edge of the tibiæ behind this projection curved and minutely serrate, the inner apical angle with a short spine. Middle and hind tibiæ each armed at apex with two short, slender spines, their outer angles more or less produced, front tarsi feebly dilated, middle and hind ones slightly broadened; claws simple.

Related to *Perthalyra*, but the front more abrupt, labrum not bilobed, prosternum bent abruptly downward behind the front coxæ and structure of front tibiæ radically different.

Quadrifrons castaneus, sp. nov.

Oblong-oval, convex. Above dark reddish or chestnut-brown, rather thickly clothed with slender, prostrate golden-yellow hairs, those along the margins of thorax, elytra and legs longer and erect, forming a fringe; antennæ, legs and under surface somewhat paler reddish-brown. Head nearly three times as wide as front, finely and sparsely granulate. Thorax convex, more than twice as wide as long, sides broadly rounded, apex feebly and broadly emarginate, base truncate, hind angles rounded; disc minutely alutaceous, finely and sparsely granulate-punctate, each puncture bearing a prostrate yellow hair. Scutellum very large, semi-oval, its apex broadly rounded. Elytra oblong, convex, scarcely as wide as middle of thorax, one-third longer than wide, sides very feebly

curved to apical fifth, then broadly rounded into the subtruncate apex; disc not striate, sculptured and pubescent like the thorax. Pygidium rather widely exposed, finely and sparsely granulate-punctate. Abdomen finely and rather closely punctate. Length 3.2 mm.

Dunedin, Florida, rare; April 5. Taken from beneath a decaying woody fungus.

Family SILPHIDÆ.

Anogdus dissimilis, sp. nov.

Oval, convex, robust. Dark reddish brown, shining, almost glabrous; club of antennæ and a faint cloud on elytra fuscous-brown. Antennæ 10-jointed, the seventh or basal joint of club not much more than half the width of eighth and subequal in width to tenth. Head finely and rather sparsely punctate, the punctures in front tending to coalesce and form minute transverse grooves. Thorax convex, less than twice as wide as long, sides broadly rounded, apex broadly but feebly emarginate, base truncate, hind angles rounded; disc very finely, shallowly and sparsely punctate. Scutellum large, triangular, its apex acute. Elytra oval, convex, scarcely wider than thorax at middle, one-fourth longer than wide conjointly, sides parallel to beyond middle, then broadly curved to the obtusely rounded apex; striæ rather fine, their punctures small, round, very close-set; intervals feebly convex, minutely and rather closely punctate. Under surface finely and sparsely punctate. Length 2.2—2.4 mm.

Dunedin, Fla., scarce; Oct. 31—Nov. 23. Swept from flowers of the hoary lupine, *Lupinus diffusus* Nutt. In *A. capitatus* Lec., the only other described species, the seventh joint of antennæ is as wide as the eighth and ninth, the thorax is nearly three times as wide as long, with arcuate base and coarsely punctured disc, and the striæ are crenately punctured. The margins of elytra in *dissimilis* are fringed with very short stiff hairs and the legs, especially the femora, bear numerous coarse, stiff, yellowish ones.

Family COCCINELLIDÆ.

Brachyacantha floridensis, sp. nov.

Narrowly oval, convex. Black, sparsely and finely punctate: head between the eyes, a large spot near each front angle of thorax,

and a humeral, basal and very large postmedian triangular spot on each elytron yellow; antennæ, palpi and legs yellow, the femora slightly clouded with fuscous. Elytra feebly and broadly curved from behind the humeri to apex. Length 2.5 mm.

Ocala, Florida; April 17. Allied to *B. quadripunctata* Melsh., but form distinctly narrower and more elongate-oval, punctures much sparser and colour of elytra and legs very different from that species or any of its varieties. The large yellow spot on each elytron is triangular, with its broad emarginate base extending from the margin near middle four-fifths the distance to suture, its sides gradually converging backwards to an obtusely rounded apex near the tip of each elytron. The elytra, in fact, are as much yellow as black, the black areas comprising a rather broad sutural stripe, a broad cross-bar on basal third, with a medium spur forward between the yellow basal and humeral spots, and a narrow apical bar. The larger yellow spot is narrowly connected along the margin and epipleura with the one on humerus.

Family SCARABÆIDÆ.

***Onthophagus nigrescens*, sp. nov.**

Broadly oval. Above uniform black, strongly shining; beneath reddish brown, antennæ and palpi paler. Clypeus with margin strongly reflexed, elevated and feebly emarginate at middle, surface of clypeus very sparsely and finely punctate. Vertical carina obsolete at middle, elevated at each end into a long tapering horn which extends above the level of the thorax. Thorax with front median portion of disc strongly convex and rounded but without a sign of a process; surface finely and rather sparsely punctate, each puncture bearing a very short erect blackish seta. Elytral striæ fine; intervals feebly convex, not alutaceous, each with two or three rows of minute punctures, their setæ extremely short, almost invisible. Pygidium coarsely and rather closely punctate. Under surface finely and very sparsely punctate, the abdomen minutely alutaceous. Length 6 mm.

Dunedin, Florida; Nov. 1. One male from a decaying fleshy fungus. Allied to *O. striatulus* Beauv., but that species is piceous-bronzed, with clypeus subtruncate at middle, setæ of both thorax

and elytra much longer, whitish and inclined, and elytra intervals flat and alutaceous. A study of an extended series leads me to believe that *striatulus* is a distinct species and not a variety of *O. fennus* Panz., as placed by Horn and retained in my Coleoptera of Indiana.

Family CHRYSOMELIDÆ

***Haltica vaccinia*, sp. nov.**

Oblong-oval, convex. Uniform dark coppery red, shining, the antennæ, except the basal joint, and the tarsi piceous. Eyes large, coarsely faceted. Thorax three-fourths wider than long, sides broadly rounded, disc very minutely and sparsely punctate, the basal impression narrow, deep, entire. Elytra one-third wider at base than thorax, umbones feebly developed, not limited within by an impression; disc finely, rather closely and evenly punctate, the intervals between the punctures minutely alutaceous. Abdomen finely granulate-punctate. Last ventral of male with a narrow, longitudinal median impression, more distinct near apex; of female with a rounded impression each side near base. Length 3—3.2 mm.

Twenty or more specimens swept from the flowers and foliage of a dwarf huckleberry, *Vaccinium* sp. ? near Dunedin, Florida; March 11 - Dec. 13. Smaller and more slender-bodied than *H. ignita* Ill., the thorax broader, punctuation of elytra denser and more even, umbones less prominent and colour uniform, the under-surface and legs except tarsi being of the same coppery-red hue as the upper surface.

Family RHYNCHITIDÆ.

***Rhynchites perplexus*, sp. nov.**

Oblong, subconvex. Above bluish-black, feebly brassy; antennæ, tibiae and tarsi piceous; under surface and femora black; pubescence very fine, sparse, prostrate. Beak slightly shorter than thorax, male; one-fourth longer, female; very slightly widened and sculptured with coarse, elongate punctures in front of antennæ; front bluish, strongly alutaceous, finely and sparsely punctate. Thorax subcylindrical, as wide at middle as long, slightly narrowed in front and near base, densely and rather finely punctate, the

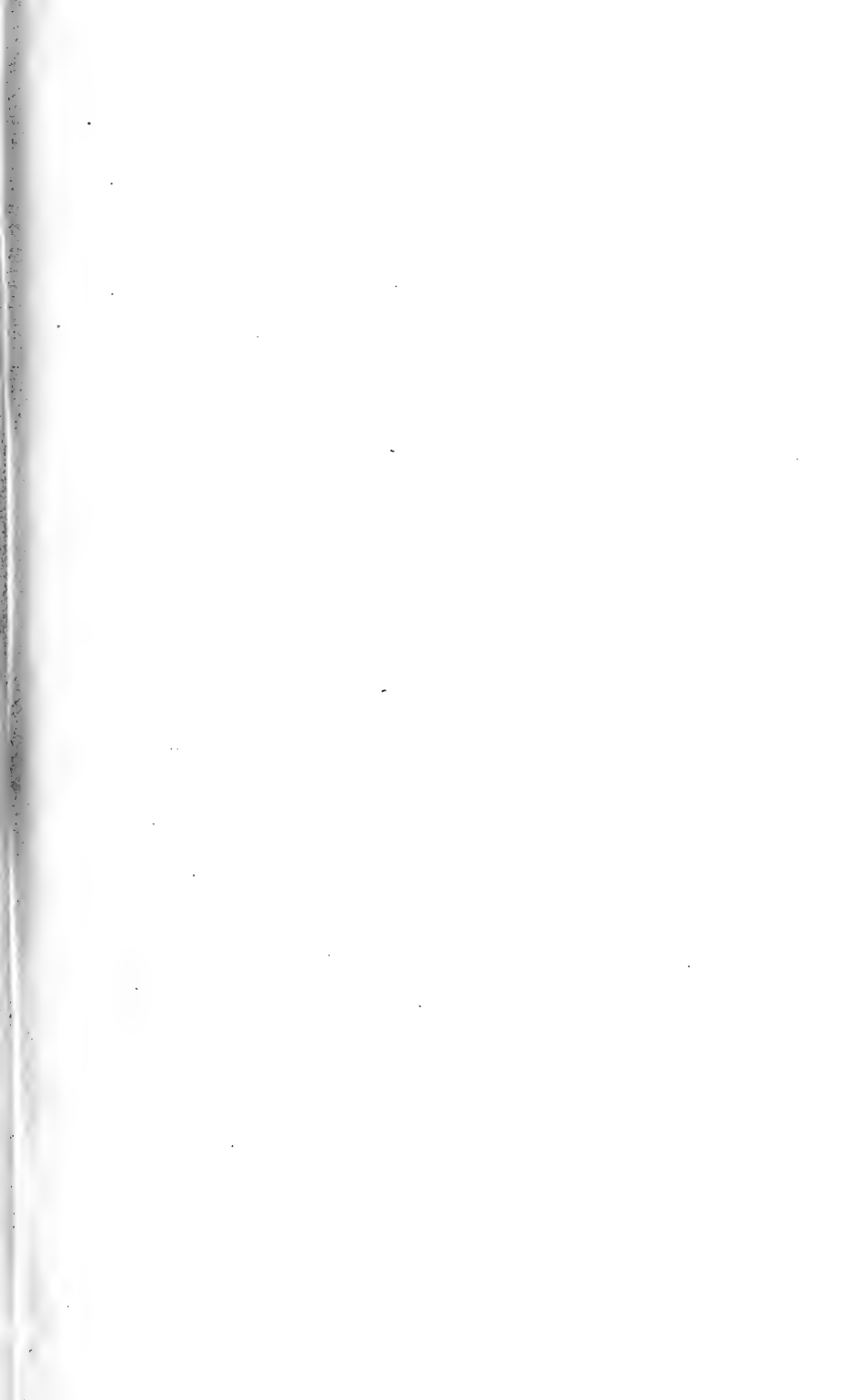
punctures more or less confluent. Elytra at base one-half wider than thorax, sides subparallel for four-fifths their length, then broadly rounded to apex; disc feebly but distinctly depressed on basal third; stria punctures coarse, rounded, wider than intervals. Pygidium sculptured like front; side pieces of meso- and metasterna coarsely, rather closely punctate; abdomen finely, very sparsely punctate. Length 1.6—1.8 mm.

Crawford County, Indiana, June 24. Swept from low herbage. Okefinokee Swamp, Georgia, June; Leng collection. Massachusetts; LeConte collection. Easily distinguished from *R. æratus* Say by its colour, shorter beak of male and more feeble elytral depression. Resembles *R. cyanellus* Lec. but smaller, darker, beak much shorter and head much more finely punctured. The eyes of male are round and somewhat larger than the elliptical, more finely faceted ones of female.

***Rhynchites elusus*, sp. nov.**

Oblong-oval. Black, feebly tinged with bronze; antennæ and legs piceous, pubescence gray, very fine and sparse. Beak of both sexes as long as head and thorax, distinctly widened and flattened near tip, much more finely sculptured than in *perplexus*, front bronzed, very finely alutaceous, minutely and very sparsely punctate. Thorax shorter and wider than in *perplexus*, widest at basal third, its disc finely, deeply and very densely punctate, the punctures not confluent. Elytra at base one-half wider than thorax, sides parallel for half their length, then broadly curved to the rounded apex; disc widely and shallowly depressed at basal third; stria punctures small, rounded, close-set. Abdomen alutaceous, finely and sparsely punctate. Length 1.8—2 mm.

Dunedin, Florida, March 25—April 13. Six specimens swept from huckleberry blossoms. The much longer and apically wider beak, more finely sculptured front and broader thorax and elytra separate this readily from both *æratus* and *perplexus*. It is probable that *elusius* and *perplexus* have been hitherto confused in collections with *æratus* Say. The latter is distinctly coppery in hue, with the sub-basal elytral depression much more distinct and the beak in both sexes as long as thorax.





A



B

PLATYPUS WILSONI, N.SP. (See p. 100.)

PLATYPUS WILSONI—A NEW SPECIES OF *PLATYPUS*
FROM BRITISH COLUMBIA (*PLATYPODIDÆ*,
COLEOPTERA) *

BY J. M. SWAINE,

In charge of Forest Insect Investigations, Entomological Branch, Ottawa.

The species of *Platypus* described herewith is very abundant and injurious on the southern half of the British Columbia coast. Although mentioned in literature and not unknown to collectors, it apparently has never been described. Its habits are those of a true ambrosia-beetle; the adults excavate a cylindrical tunnel from about six to fourteen inches in length through the bark and directly into the wood of large and small trunks, in small trunks usually curving around the heart. A characteristic fungus always found coating the walls, which are stained black thereby, serves as food for the larvæ, and to a lesser degree for the adults. Eggs, larvæ and adults are found free in the tunnels. The boring dust, ejected in abundance from the tunnel entrance and lodged in heaps in the bark crevices, is in the form of minute white splinters (Pl. VII, Fig. 1). It is readily distinguished from the meal-like boring-dust of *Gnathotrichus* frequently found in the same trunks.

It attacks all conifers of the British Columbia Coast, with the exception of *Thuya* and *Chamæcyparis*, but is most abundant in *Pseudotsuga*, *Tsuga*, and *Abies grandis*. The species is abundant on the coast as far north as Seymour Narrows and inland in the south to Agassiz.

Dying or badly weakened trees and freshly cut logs are usually selected for attack, but standing trees with considerable green foliage are not infrequently affected. A tree showing the piles of boring-dust of this species and of *Gnathotrichus* is invariably beyond hope of recovery. These piles of boring-dust are frequently seen on the blackened bases of trees injured by ground fire; in such cases the beetles enter through the fresh tissue exposed by cracks in the drying outer bark. The details of the life-history will be given elsewhere. The specific name is given in honour of our colleague, Mr. Tom Wilson, of Vancouver, B. C., who first collected the species in British Columbia.

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa.

March, 1916

Platypus wilsoni n. sp. The female type: Length, 5.5 mm.; width, 1.3 mm., shining, with the pubescence inconspicuous above, except on the front and about the declivity.

The head has the whole front broadly and deeply excavated, densely granulate-punctate and clothed with long yellow hairs; the vertex coarsely punctured, the punctures shallow and elongate, and with a narrow, shining, median carina; the epistomal margin nearly straight, very broadly concave, with a small, inferior median lobe clothed above with orange setae. The antennal scape is stout, longer than the funicle, the pedicel subglobular, as long as the remaining three segments, the club densely pubescent and with sparsely scattered stouter bristles.

The pronotum is one-fifth longer than wide; the cephalic margin broadly evenly arcuate and finely margined; the sides subparallel, with a broad and deep emargination just behind the middle; the hind angles rounded; the caudal margin transversely bisinuate with the median prolongation rather small and acute; the disc irregularly depressed about the median line, with a median sub-oval area on the caudal half very finely and densely punctate, this densely punctured area divided on the middle line by a fine, black, slightly impressed line, and with the strongly convex caudal margin extending nearly to the caudal margin of the pronotum; the remainder of the pronotum finely punctured, more sparsely in front, more closely on the sides and behind, with coarser setose punctures close to the cephalic margin; the pubescence elsewhere minute and inconspicuous.

The scutellum is strongly depressed, very elongate and very sharply acuminate.

The elytra are elongate, slightly more than twice as long as wide, about as wide as the pronotum; with the sides parallel, slightly inflated behind the middle, gradually arcuately narrowed on the caudal fifth to the subtruncate apex; the disc gradually depressed behind on the apical fourth to the very short, nearly perpendicular declivity; the striae distinctly impressed, but disappearing near the apical declivity; the strial punctures close, rather faintly impressed, individually narrow and elongate; the interspaces convex, smooth, similar, almost unipunctate on the basal two-thirds, on the apical third with nearly uniseriate, granu-

late and setose punctures with small punctures intermixed, the granules coarser and acute on the sides; the third interspace strongly widened at the base, swollen and densely, finely granulate; the short abrupt declivity with a rounded prominence on each side above, finely, closely granulate and setose-punctate, without striations, moderately concave apically, with the caudal margin subtruncate, bisinuate, and the lateral angles rather strongly dentate.

The metasternum is smooth and shining, finely punctured, the pubescence slender, the median line deeply striate on the caudal two-thirds; the abdominal sternites are closely, finely, granulate-punctate and clothed with slender hairs, the last more densely granulate; the last three sternites with the cephalic and caudal margins somewhat elevated, the last sternite rather distinctly concave therefrom.

The *male* has the epistomal margin more deeply though very broadly emarginate dorsally with the inferior lobe more prominent; the front similar though less deeply concave and with somewhat shorter hairs; the pronotum similar, lacking the densely punctured median area, but with a median black line in the same position and very distinct; the elytra with the sides parallel for three-fourths the length then strongly arcuately narrowed to the individually strongly produced apices, the lateral margin concave at the base of the prolongation; the apical prolongations each slightly longer than wide, emarginate at the apex, with the outer angle much longer than the inner, blunt and obtusely carinate above from a continuation of the united 2nd and 3rd interspaces, the carina ending in a third blunt point on the dorsal apical margin of the prolongation; with a smaller tooth between the dorsal and outer teeth and three serrations between the dorsal and inner teeth; the suture, viewed from the side, straight on the basal two-thirds, and gradually depressed on the caudal third to the apices, without an abrupt declivity; the stria punctures notably coarser than in the female; the interspaces somewhat more convex; the second less strongly widened at the base and more finely granulate; the interspaces minutely, uniseriately punctured on the disc, but not striate; the punctures coarser, more numerous and finely granulate at the base of the 1st and 3rd; on the depressed caudal third all the inter-

spaces more strongly but similarly convex, except the 8th, carinate and closely, uniseriately, coarsely granulate, with stout reddish, uniseriate hairs; the 2nd and 3rd united at the base of the apical prolongation to form its dorsal carina, the 8th more strongly carinate on the apical third, the 9th granulate throughout its length, sparsely and more feebly on the middle third, rather coarsely and irregularly at the base.

The metasternum has the middle line sulcate on the caudal half; the abdominal sternites are closely, moderately granulate-punctate, more coarsely than the metasternum and more coarsely than in the female, and with distinctly longer hairs.

The type, a female, is from *Tsuga heterophylla*, taken at Campbell River, B. C. It is in the collection of the Entomological Branch, Department of Agriculture, Ottawa.

PLATE VI.

A. *Platypus wilsoni*, ♀. Greatly enlarged. Slightly modified from Entomological Bulletin No. 7, Dept. of Agriculture, Canada.

B. *Platypus wilsoni*, ♂. Apices of the elytra. Greatly enlarged.—(Original).

PLATE VII.

1, Boring dust of *Platypus wilsoni*; 2, Maxilla; 3, Labium; 4, Maxillary Palp, greatly enlarged; 5, Antenna. All enlarged. (Original).

DESCRIPTION OF ELEVEN NEW SPECIES OF CHALCID FLIES.

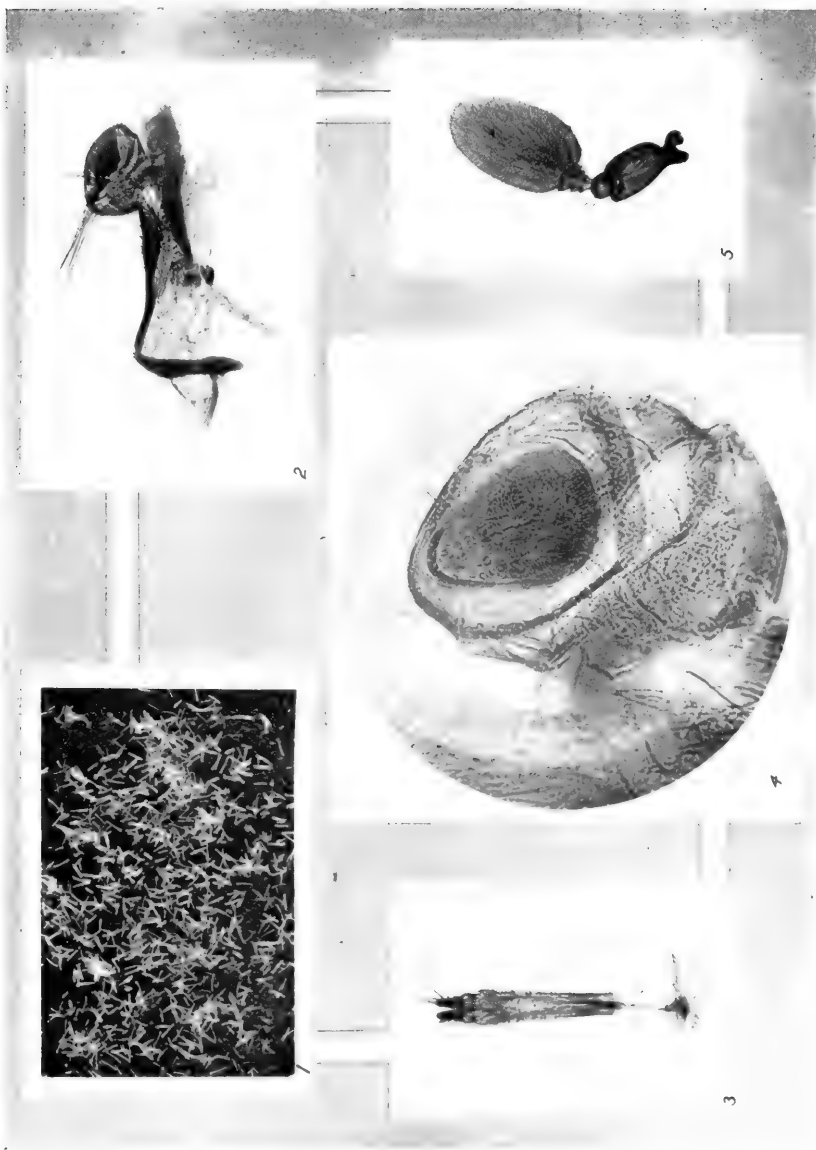
BY A. A. GIRAULT, WASHINGTON, D. C.

Neomphaloidella ceroplastæ, n. sp.

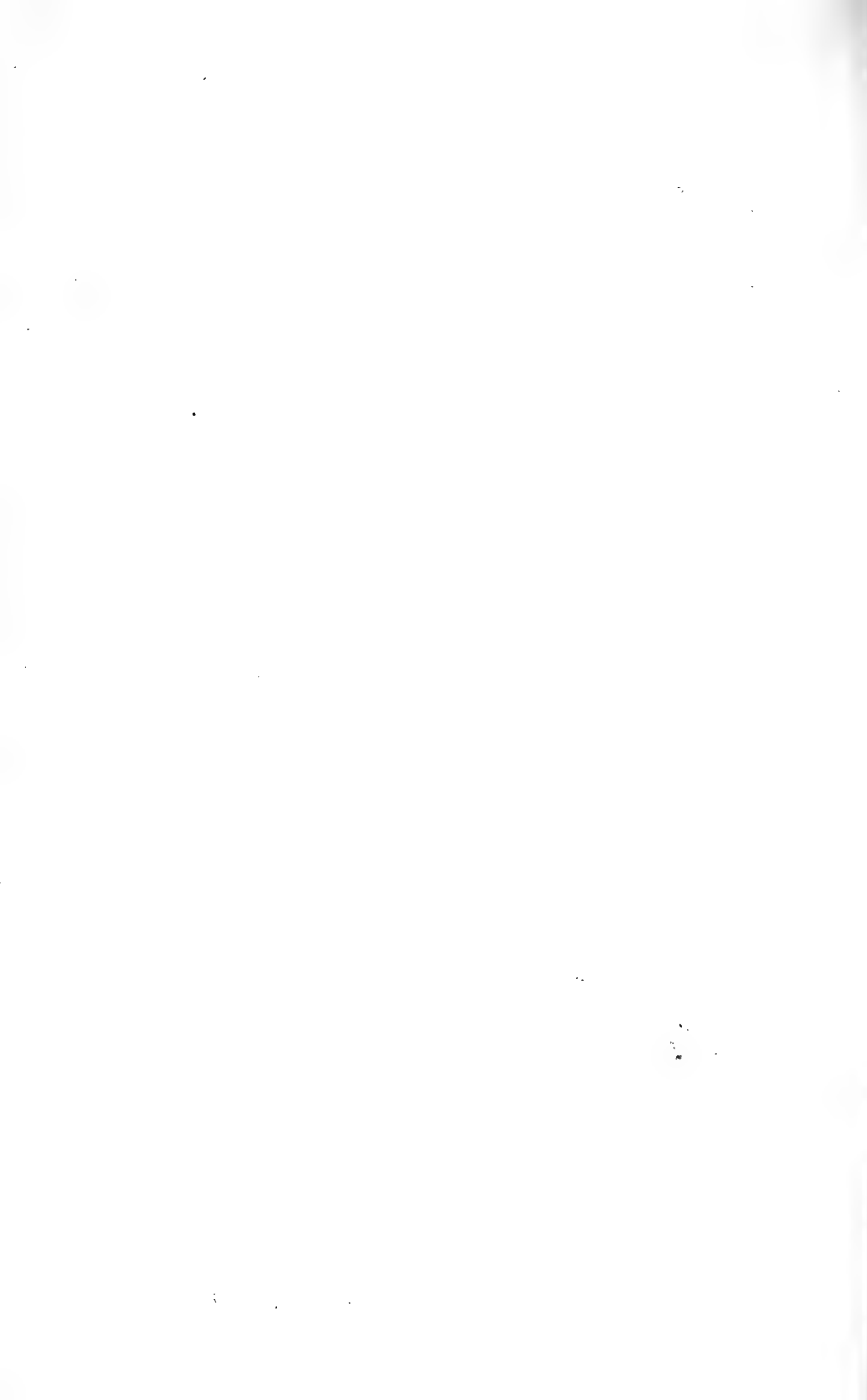
Female—Length 1.00 mm.

Differs from *Tetrastichus periplanetæ* Crawford in being darker, the scape is partly metallic, there is no lateral carina on the propodeum, the latter is not distinctly scaly, there are punctures along the lateral margin of the scutum.

Greenish black, the wings hyaline, the venation pale yellow, the knees, tibiae and tarsi (except the last joint) distal half of scape and the pedicel, except the proximal half above, golden yellow. Funicle joints subequal, each nearly twice longer than wide, slightly longer than the pedicel; club 1 as long as funicle



PLATYPUS WILSONI, N.SP. (See p. 100.)



3, half the length of the club, the third joint with a convex base and a distinct terminal nipple. Scape a little compressed. Mandibles tridentate, the second two teeth weakly separated, the third truncate, but not large. A line of delicate punctures across the pronotum. Stigmal vein of moderate length.

The male is about the same, but the propodeum and flagellum not seen.

Described from one male and seven females reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa (C. C. Gowdey).

Types—Catalogue No. 19914, U.S.N.M., three females on tags, one male and two females head on a slide.

***Neomphaloidella pulchriventris*, n. sp.**

Female—Length 1.20 mm.

Dark metallic purple, the wings hyaline, the legs, antennae and abdomen lemon yellow, with the following exceptions: Distal joint of club (washed with purple), proximo-dorsal half of pedicel, bases of coxae, middle femora (except ends), a cinctus just below middle knee, lateral margin of abdomen, the acute distal fifth (or somewhat more) of the abdomen and two faint cross-stripes on abdomen (both interrupted along the meson) between the centre and the distal purple. The marginal stripe of abdomen is broken or partly so just where it joins the distal purple and there is a marginal dot at middle of the abdomen. Second two ring-joints very short. Funicle 1 nearly thrice longer than wide, a little longer than 3, which is longer than any club joint or the pedicel. Club with a distinct nipple. Mandibles tridentate. Venation yellow, the stigmal vein long. Fore wings broad. Propodeum with delicate median and lateral carinae, the former flat. Abdomen conic-ovate. Sculpture usual.

Described from one female captured by sweeping in the open forest, October 10, 1915, at Glenndale, Prince George County, Maryland.

Type—Catalogue No. 19915, U.S.N.M., the above specimen on a tag, the head on a slide.

A second female, same place, October 24, 1915.

Gonatocerus partifuscipennis, n. sp.

Female—Length 0.85 mm.

Black, opaque, the first two pairs of knees and the four proximal tarsal joints, reddish brown; fore wings with the distal third distinctly infuscated, the venation dark. Thorax scaly, the parapsidal furrows shallow, the scutellum simple, the propodeum with a very widely separated pair of median carinae. Fore tibiae with about five small teeth dorsad, the last near apex. Funicles 1-4 subequal, each a half longer than wide, shorter than the pedicel, narrower than the others; 5 and 7 longest, each twice longer than wide; 6 and 8 subequal, somewhat longer than 4. Scape compressed. Marginal fringes of the fore wing not long, about a fifth of the greatest wing width, the discal cilia very fine. Strigil present. Caudal wings acuminate, bearing a pair of discal cilia along the caudal margin and about three long lines cephalo-distad, the caudal marginal cilia longer than the marginal cilia of the fore wing. Caudal tibial spur single.

Described from one female captured by sweeping in open forest, Glendale, Maryland, October 11, 1915.

Type—Catalogue No. 19916, U.S.N.M., the above specimen on a slide.

Phaenodiscus partifuscipennis, n. sp.

Head lenticular, the distinct scrobes short, weakly joined above. Marginal vein thrice longer than wide, subequal to the postmarginal, the curved stigmal longer. Similar to *aeneus* Dalman (compared with German specimens in the U.S.N.M.), but the fore wing, though similarly infuscated, bears also a very large hyaline space between near base (where the wing is longitudinally infuscated caudad) and two-thirds the way out to the hairless line; otherwise as in *aeneus*. Scutum punctate, the punctures sparser on the scutellum.

The male has the wings hyaline, the antennae yellowish, the scape and pedicel dorsad purplish; funicle 1 five times longer than wide, longest. Pedicel short, club not seen, otherwise like the female except tips of tibiae (most of first tibiae) yellowish. The mandibles in both species are obtusely, equally tridentate.

From one male, two females labelled "Italy, State Insectary, California. Ex. *Saissetia hemisphaerica*."

Types—Catalogue No. 19917, U.S.N.M., a pair on tags and

a slide bearing the male and female heads and wings and the same of female *æneus*.

***Sympiesomorphelleus trisulcus*, n. sp.**

Female—Length 2.50 mm.

Agrees with the description of *Diglyphus maculipennis* Ashmead, but purplish, the scutellum is very slightly rippled and has the median groove only along proximal two-thirds, the infuscation of the fore wing is lighter and more suffused, the flagellum is light yellowish, while the legs and scape are white. Head with scattered pin-punctures. Abdomen honey yellow, except most of segment 2 of the abdomen dorsad, which is washed more or less deeply with purple and occupies about a third or more of the surface. Propodeum tricarinate and with a distinct cross-carina about the middle. Mandibles about 10-dentate. Funicle 1 nearly thrice longer than wide, 4 somewhat longer than wide, longer than the pedicel. Club 2 only about half the length of 1.

Described from one female, minutien-mounted, in the U.S.N.M. labelled "*Diglyphus albipes* Ashmead. Male type, 1500 feet, St. Vincent, West Indies, H. S. Smith."

Type—Catalogue No. 19918, U.S.N.M., the above specimen plus a slide bearing the head and a hind tibia.

***Neomphaloidella nebraskensis*, n. sp**

Female—Length 1.50 mm.

Black-brown, the wings hyaline, the venation white, the first two pairs of tibiae, the tarsi, the knees broadly and tip of caudal tibiae yellowish white. Postscutellum, lateral margins of scutum very narrowly and the mesopleuracic sutures yellowish. Propodeum with a narrow median carina, no lateral carina. Punctures along lateral margin of scutum very obscure. Of the usual fine sculpture. Funicle 1 two and a half times longer than wide, 2 and 3 each nearly twice longer than wide; club with a terminal nipple, its first joint slightly shorter than funicle 3. Pedicel elongate, a little longer than funicle 3. Mandibles tridentate.

Described from one female on a tag in the U.S.N.M., labelled "Lincoln, Neb., Webster, No. 2142. G. I. Reeves."

Type—Catalogue No. 19919, U.S.N.M., the above specimen plus a slide with the head.

(To be continued.)

REPORT OF THE DOMINION ENTOMOLOGIST.

In the Report of the Dominion Entomologist for the year ending March 31st, 1914, which has just been published, an account is given of the activities of the Entomological Branch of the Dominion Department of Agriculture, in the matter of controlling insect pests throughout Canada, and all who are interested in this subject will be repaid by a perusal of this record of a year's work. The Department now maintains nine field laboratories in different parts of the Dominion, at which investigations on various insect pests are carried on. This line of work constitutes the chief aspect of the work of the Branch. A large amount of work is necessitated by the administration of the Insect and Pests Regulations of the Destructive Insect and Pest Act, involving the inspection and fumigation of trees and plants entering Canada. Perhaps one of the most interesting of the activities of the Branch is the work carried on against the Brown-tail Moth in Eastern Canada, particularly the importation and establishment of the parasites of this insect and the Gipsy Moth. A map is given, showing the places in Canada where the parasites of the Brown-tail and Gipsy Moths have been distributed by the Department. Other branches of work covered by the Report are investigations on insects affecting cereals and other field crops, including an account of the notorious Army-worm outbreak of 1913; insects affecting fruit crops, as the result of which investigation work of great practical value has ensued; insects affecting forest and shade trees in which an account of the investigations of Stanley Park, Vancouver, which has been so seriously affected by forest insects is given; insects affecting domestic animals and man, and insects affecting garden and greenhouse. The Report is a record of marked progress in a branch of the work of the Department of Agriculture which not only affects agriculture, but also forestry and public Health. Copies of this Report may be had free on application to the Publications Branch, Department of Agriculture, Ottawa, and requests for the Report may be mailed free.—[Press notice from the Ottawa Department of Agriculture.

NOTES AND QUERIES.

NOTES ON HIBERNATING LADYBIRD BEETLES.

With the exception of frequent specimens of ladybird beetles passing the winter in houses, the writer has only occasionally found hibernating forms. In consequence of this, the discovery of a large number of the species *Adalia bipunctata* Linn., in their winter quarters, has proven more than usually interesting. The

removal of a sheet of bark, from a dead White Pine, disclosed over a hundred beetles of this species. They were congregated in several groups that averaged approximately a dozen specimens. The debris produced by the boring of bark beetles furnished the material among which they had found shelter. As less than a couple of square feet of the tree was stripped, there is no doubt that many more were hibernating beneath the bark on the remainder of the tree.

It is safe to assume that several factors were operative in causing the collecting, at one place, of such a large number of beetles of the same species. Either the situation chosen by them may have presented ideal conditions for hibernation and thus proved attractive to many specimens, or this species may be gregarious in its winter habits. Also the proximity of High Park would ensure, in the neighborhood, a luxuriant growth of various plants furnishing suitable feeding grounds for aphids during the summer, a circumstance that would react favourably on the production of the ladybirds.

On November 20th, the date upon which the observation was made, the beetles had not become entirely dormant, but, when disturbed, showed slight signs of activity.

A. COSENS, Toronto, Ont.

Hepialus thule at rest.—I had occasion, last July, to keep a ♂ *H. thule* alive for a couple of days, and noticed that, in clinging to the sides of the box or to branches, the first two pairs of legs only are used. The hind pair, which bear the great tufts of scent distributing hairs, are drawn up alongside of the body. This is shown in the reduced sized photo of the moth accompanying Mr. Swaine's article in Can. Ent. XLI, 337-343, pl. 10, fig. M (1909), but the position is always head up.

I do not recollect seeing any reference in our literature to this habit.

A. F. WINN, Westmount, Que.

A New Enemy of Poplars and Willows in New Jersey.—During the past few summers, a small greenish-blue Chrysomelid was observed feeding in considerable numbers on poplars and willows chiefly in nurseries at Arlington, Elizabeth, Irvington, and several other northern New Jersey points. Very little attention was paid to it, inasmuch as it was assumed to be a native species. It turned out,

however, to be *Plagiodera versicolora* Laicharting, which is an old name for the common *P. armoricae* of Europe. From its activity in New Jersey, it can easily do considerable damage, feeding as it does, in both larval and adult stages, but, of course, can undoubtedly be kept in check by arsenical sprays.

HARRY B. WEISS, New Brunswick, N. J.

Bat Fleas.—The Hon. N. Charles Rothschild has very kindly sent me word that the bat-fleas of which I gave an account in the Annual Report of the Ent. Soc. of Ont. for 1909, belong to the species: "*Ischnopsyllus insignis* Rothschild. Nov. Zool., Vol. X, p. 319, No. 4, pl. IX, figs. 8-12, 1903."

I am much pleased to receive this authoritative identification of the insects.

THOMAS W. FYLES.

Ottawa, January 27th, 1916.

Apropos of the late Prof. Webster's note in the Can. Entom. Vol. XLVII, p. 406, I can report an assembling of *Anosia plexippus* which seemed to me remarkable on account of both the earliness of the date and the situation.

In connection with an investigation of the introduction of the San José Scale into Ontario, I called on the 16th day of August, 1899, upon a farmer who, the neighbours said, was the first man to observe it in the Niagara district. His farm was on the Lake Ontario shore (south side) a few miles west of the mouth of the Niagara River. A grove across his property cut off the view of the lake. In conversation, he mentioned the fact that this grove was then swarming with red butterflies. I went back through it and found that he had not exaggerated, for, verily, there was a multitude of "monarchs" there "that no man could number."

London, Ont., Dec. 12, 1915.

JOHN DEARNESS.

NELSON'S "EMBRYOLOGY OF THE HONEY BEE."

THE EMBRYOLOGY OF THE HONEY BEE. By J. A. Nelson, Ph.D. 282, p.p., 95 + XV. figures. Princeton University Press. Price \$2 net. 1915.

In the short preface that he has written for this book, Dr. E. F. Phillips explains that in it "is presented to the beekeeping public, as well as to those whose interests are more scientific, the

most thorough account of the complex development of the bee egg yet published, and to those interested in bees no apology for investigations of this kind is needed. It is of interest to the bee enthusiast, for, while possibly he may not fully appreciate all the details discussed, he will assuredly want to take such facts as his training permits." With all of which we most heartily agree. As a class, beekeepers are the greatest of enthusiasts, but it was well that Dr Phillips exercised his usual caution and used the qualification "as his training permits," for we can imagine the untrained bee enthusiast in a commendable endeavour trying to master the terminology of the cytologist and embryologist, to unravel the description of mitotic phenomena and to decide for himself, for there is no room for indecision in beekeeping, as to the origin of the mesenteron. With a profound conviction of the marvellous nature of the processes that go on during those seventy-six hours required for the development of the egg, a deep admiration for the author who has so skilfully studied and described those changes and pride in the possession of such a work, he will lay it down and slip away to his apiary to see whether any of his colonies need requeening.

Dr. Nelson's monograph constitutes a very valuable contribution to our knowledge of insect embryology, a branch of our science which has received all too little attention on this continent. It is a useful work mainly for two reasons. First, the author has investigated, with the aid of improved technique and modern methods of research, a problem previously studied in considerable detail by such workers as Bütschli (1870), Kowalevski (1871), and Grassi (1884), upon whose results we have necessarily had to rely for our knowledge of the embryology of this insect. Secondly, the author has not confined himself to a description of the results of his own careful work, but he has brought together in a desirable form the main results of other workers on insect embryology upon which subject, accordingly, the volume constitutes almost a complete review, and on that account will be of great value to students and others desiring such information.

The author describes in sequence the embryological changes: Cleavage, formation and completion of the blastoderm, the formation of the germ layers, and the amnion. After a general account

of the development of the embryo the development of the various organs is described: The nervous and tracheal systems, the oenocytes, muscles, fat-body, circulatory and genital systems and alimentary canal. A useful summary is given at the end of the book; in this connection we think the value of the book would have been enhanced by the inclusion of a summary at the conclusion of each chapter.

On the whole, Dr. Nelson confirms the observations of the previous investigators who have studied the development of the bee egg, and his work does not afford any striking differences or discoveries. The account of the cleavage of the egg agrees in the essential details with the earlier work. In regard to the vexed question of the origin of the mesenteron, the importance of which has always been emphasised on account of its bearing of the broad theory of the germ layers, the results of this study are held to lend little support to the views of those who regard the mesenteron of insects as arising from the ectoderm of the stomodæum or proctodæum, and to harmonize still less with the theory of the origin of the mesenteron from cells remaining in the yolk. The author considers a final decision between these two rival interpretations premature. Certainly the honey bee is too highly a specialized member of a specialized order upon which to base generalizations. It is found that the anterior and posterior mesenteron rudiments are formed from the blastoderm of the ventral plate by an inward movement of its cells. The book is characterized by a desire on the part of the author to review the conclusions of previous investigators of the embryology of the honey bee and of other insects, to present the results of his own study and to leave the detailed discussions of rival interpretations to those who prefer the atmosphere of debate, and in a work of this character and purpose we think such an attitude is perhaps desirable.

The numerous excellent illustrations, on which the author is to be heartily congratulated, increase the value of a book which will be very useful to students of insect embryology, and to those beekeepers who may be qualified by their training or mental courage to appreciate what is undoubtedly the best account we have of the development of the egg of the honey bee.

C. GORDON HEWITT.

The Canadian Entomologist.

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No. 4

POPULAR AND PRACTICAL ENTOMOLOGY.

THE FIVE THOUSAND DOLLAR BUTTERFLY.

BY R. P. DOW, BROOKLYN, N. Y.

Somewhat over eight centuries have elapsed since the men of Europe woke from the slumber of the Dark Ages and began to value mental culture. Men of classic times do not appear to have been "collectors" except of art works. In the Renaissance there was a turn to Natural History, possibly inspired by the Moors, who taught even Entomology in their universities. Too many of the new collectors looked for unicorns, nine-headed hydras, and the like, but there was nothing more popular than a display of butterflies. The first collection of the "Frail Children of the Air" which is now known was made by an Italian toward the end of the Eleventh Century. From that time the number of Entomologists increased amazingly, although not until about A.D. 1600 was any truly scientific work done. However, it is much the same to-day. There is a goodly representation in every Entomological Society of students, of close observers, even of patient taxonomists, but the majority are still mere collectors, desiring nothing more from their fellows than the scientific names of their specimens and using no more mental acumen than is necessary to get together postage stamps or tin tobacco tags.

If a man will collect, spread and value butterflies in his cabinet, it also follows that he will buy them. He wishes for two elements, beauty and rarity. Thus the professional collector came into existence. He found business most lucrative furthest afield, in the most inaccessible corners of the earth, but he found much, too, at home. For at least a century there has existed a widespread belief that somewhere, anywhere, perhaps in one's own backyard, anyone might find a rare butterfly, so rare that some collector somewhere would gladly pay \$5,000 for the prize. It has passed orally through many lands, occasionally getting into print, but

not often, for publicity and superstition are not compatible companions. To-day in this country there are thousands of people who, if they spy a butterfly unfamiliar to them, hasten to learn if it be not the precious prize. Scarcely a year ago a newspaper printed an account of a butterfly caught near New York which was unique and for which \$3,000 was paid at once by the nearest Museum. Such items and such inquirers have become the bane of every Museum Curator's existence. Such hordes of *Pieris rapæ* or *Anosia plexippus* come in the mails, each inquiry demanding an answer! A little less than twenty years ago a prominent newspaper was guilty of printing a more startling variant of the myth. It was to the effect that the United States National Museum had just paid \$20,000 for an American butterfly. An employee was forced to devote several months of his entire working days to writing denials and pacifying visitors who came with specimens worth less than a penny for which they hoped to get thousands.

A similar myth which has got into print scores of times is that of the arctic flea. It differs much in detail. The price that it would fetch (a pair being wanted) was sometimes as low as \$1,000, but it was more often up to the traditional \$5,000. It was invariably wanted by the Hon. Mr. Rothschild. Some said the creature inhabited the fur of the arctic fox. Others cited the sea otter and called it the more elusive, as at the moment the animal was killed the parasite left the body. It is said that Mr. Rothschild has sent expeditions at the cost of tens of thousands to hunt arctic mammals until the identity of the desired flea should be forever established and the types deposited in the Tring Museum.

It is quite possible that some good-natured student of fleas would give five dollars for some new arctic species.

All this suggests two lines of inquiry: Has \$5,000 ever been paid for a single entomological specimen; if not, how much has? On the other hand, is it possible for any one in North America, excepting less than a dozen trained experts, to make even a moderate living by collecting insect rarities? Any dealer in insects might be inclined through self-interest to exaggerate the first, since he has rarities to sell, and to under-estimate the other, since he is constantly importuned to buy.

No doubt, big prices have been paid, especially long ago when travel was not so easy as it is now. A very interesting tale is that of the first collector who landed in the Solomon Islands and lived six weeks in the tree tops to avoid the head hunters. We hope his grist fetched a big price and that for his glorious new green and gold *Ornithoptera* a sum in four figures was given. We know that the first *Drurya antimachus* (or perhaps it was not even the type) was bought by a Scotchman for \$1,500, but we do not know how much of this went to the explorer who braved the malarial jungle. For a Brooklyn collection \$2,000 was once paid, there being little of value except the singleton *Actias Jehovah*, eccentrically named by Strecker. An aberrant *Papilio* was once sought from Mr. Neumogen by a Russian Prince for \$1,000, but its like can now be bought from a dealer for \$25. Girdling the world is making it smaller. Mr. Say received \$300 for his *Amblychila cylindriciformis*. It was thirty years before a second specimen was unearthed. That fetched \$50. To-day fifty cents is a fair price. Not many years ago a collector in New Jersey had in his boxes two aberrants of common *Papilio*. A dealer gave him \$25 for both and resold them for about \$300 each. The first three specimens of *Sphinx frankii*, caught not so many years ago, averaged nearly \$300 apiece. Such instances can be multiplied many times.

As for making a living by collecting, a few exceptions prove the rule of its futility. An enterprising young woman in the far west, taught by her father, a veteran collector, caught both place and psychological moment. She sold her season's catch from an untraveled mountain pass for a price which sent her through college. But how many others could get a tenth as much? Could any half-trained collector get a cent a piece for a season's catch, unless from some very remote place? A collector well trained in beetle study, whose home territory is in the mountains seldom traveled, writes to me that with constant labour he can hardly average \$5 a week.

A favorite way of collecting is to get "grubstaked." Some naturalist wants to visit some rare locality and collects funds from his friends, each contributor to take pay in "results," one taking beetles, another Orthoptera, etc. Of a score of such trips

taken or planned during the last five years I do not recall one that was successful. During three years of editorship I have received probably a thousand letters of which a sample is: "I have sixteen *cecropia* cocoons, two *Luna*, three *Promethea*, and one *Polyphemus*. What can I get for them?" What can one reply when he gives away each year several bushels of them for school study?

Even the practice of "exchanging" seems to be in decay. One reason for this is, no doubt, due to the lack of idea of fairness in giving value for value. Another is that the Lepidoptera have been so well distributed that there is little left to exchange. A while ago a selection of four hundred names was taken from the Naturalists' Directory, all marked as desiring to exchange in some province. All these were written to. A dozen replies were received, mostly to say that no more interest was taken. Not one was inclined to start exchanges on any basis whatever. In a Pacific Coast city, where Natural History has lately received a great impetus, there are sixty lads frequenting a newly established Museum, who have written broadcast, wanting to give their local butterflies in exchange for those of any other part of North America, I doubt if between them all they have received ten letters of encouragement.

Is there no pleasant side to the story? Do not some make money? Yes, many. A farmer in California allows the Dutchman's Pipe to grow in some of his fence corners. He takes enough chrysalids of *Papilio philenor* to pay the annual taxes on the whole farm. An assistant janitor of a big building in Brooklyn loves his Sunday afternoon walk in the country. One day he gathered 50,000 hibernating squashbugs (*Anasa tristis*) and sold them. He cleared \$90 in twenty walks and had lots of fun besides. One day a party of us were on Rockaway Beach when *Anosia plexippus* was swarming on the way south. They were numb with cold and easy to pick as blackberries. A day's work would have included less than, say, 20,000 of them, and they found a ready market at a cent and a half. Not a bad day for some of our collectors, whose pay envelope contains perhaps \$12 per week. A Newark collector has walked under the electric lights every warm evening for many years. He has thus aided his health;

got many rare moths, many tropical Sphingids for his own collection, and half a dozen times a year he can fill a six-quart pail with *Tropisternus triangularis* or *Benacus griseus* to go to some college for biological class room work at, perhaps, \$20 a pailful. This seems worth while.

There is something even more worth while. Love of the great "all out-doors" is its own reward. The world needs more Fabres, more Thoreaus, to transmit knowledge gained by keen and constant observation. For every hundred present casual observers there should be a hundred thousand. The things to see, to ponder over, are infinite. No Sunday afternoon "movie" show has a fraction of the interest of ten square yards of vacant city lot. There is no neglected, tangled corner in swamp or fallow field that does not teem with life, that does not afford far more profit to him who seeks patiently than the fabled Five Thousand Dollar Butterfly.

DESCRIPTION OF ELEVEN NEW SPECIES OF CHALCID FLIES.

BY A. A. GIRAULT, GLENNDALÉ, MD.

(Continued from page 103.)

Thymus, new genus of Tetrastichini.

Genotype—*Encyrtus albocinctus* Ashmead.

Encyrtus chionaspidis Howard.

Genotype of *Adelencyrtus* Ashmead. Frons subprominent, moderate in width. Mandibles tridentate, the third tooth truncate, yet with a concave apex. Marginal vein thrice longer than wide, the postmarginal and stigmal veins subequal, each about two-thirds the length of the marginal. Funicle 6 a little wider than long, 1 twice wider than long. Antennæ pale yellow, the pedicel above and distal club joint dusky. Fore wings very finely ciliate. Face much inflexed. Thorax dorsad flattened. Cheeks as long as the eyes. Runs very close to *Epiencyrtoides* Girault. The coxæ are white. The caudal femur and the flagellum are concolorous. Scutellum with somewhat rougher sculpture than the scutum. Axillæ very narrow, not quite meeting. Small. From the types in the U.S.N.M.

April, 1916

Baoanusia africana, n. sp.

Female—Length 1.35 mm.

Differs from the description of the genotype as follows: The club is only somewhat longer than the funicle; funicles 5 and 6 are white; the dorsal apex of the second tooth of the mandibles is tooth-like, appearing nearly as a small intermediate tooth; the marginal vein is only about twice longer than wide, subequal to the post-marginal, the stigmal somewhat shorter; only the tips of the tibiae, the tarsi (except last joint) and a band on caudal tibia just below the knee, are yellowish white (a broader band at base of middle tibiae); otherwise about the same. Scutellum with velvety appearance. Hairless line of fore wing with only about 4-5 loose lines of cilia proximad of it. Club obliquely truncate from the base of joint 3. Funicle 6 a little longer than 1, much wider.

The male has the knees somewhat pale, the frons distinctly broader, the facial inflexion less, the antennae inserted higher and with a long ridge-like carina between them. The antennae (except the pedicel) are reddish brown, the joints of the funicle excised and bearing two whorls of long hairs, 3 and 4 longest, over twice longer than wide, 1 about a half longer than wide, 6 a little shorter. Scape short and stout. Club solid, distinctly longer than the body of the scape, over thrice longer than wide.

Described from two males, four females in the U.S.N.M., labelled "Parasite of *Lecanium oleæ*, Cape Colony, South Africa. C. P. Lounsbury."

Types—Catalogue No. 19920, U.S.N.M., the above specimens on a tag.

Catolaccus perdubius, n. sp.

Female—Length usual.

Differs from *nigroæneus* Ashmead, which is the same in the female as *caliodis* Ashmead in that the tibiae in both sexes are deep metallic blue-black (in the other species only lightly embrowned, more so at base), and the male is like the male of *incertus*. Differs from *incertus* Ashmead in that the funicle joints are all short, 6 only slightly shorter than 1, subquadrate, 1 slightly longer than wide, shorter than the moderate pedicel.

Described from a large number of each sex reared in connection with the strawberry weevil, St. Paul, Minnesota (S. Marcovitch).

Compared with types of the named species.

Types—Catalogue No. 19921, U.S.N.M., two males, four females on two tags, a female head and hind leg on a slide.

Hyssopus, n. gen. of Ophelinini.

Female—Agrees with the description of *Dichatomus* Foerster, but the scutellum bears the lateral grooves which join around the apex, and there is but one very short ring-joint (but the base of funicle 1 is rimmed like a second one). Club without a terminal nipple, distinctly 2-jointed. Propodeum with a distinct median carina and a lateral carina, which runs directly from the spiracle. Mandibles 7-dentate, 6 and 7 small, feebly divided. The large, quadrate pronotum longer than the scutum. Abdomen subsessile, flattened, a little longer than the thorax. Cephalic tibia without a strigil, the spur short and straight. Marginal vein subequal to the submarginal, the stigmal slender, about a third of the length of the marginal, shorter than the postmarginal.

Hyssopus thymus, n. sp. (Genotype).

Female—Length 0.85 mm.

Very dark, nearly black, the wings hyaline, the thorax scaly, the propodeum glabrous, the trochanters, tips of tibiae broadly, and the tarsi yellow, the venation dusky yellow. Pedicel a half longer than wide, a half longer than funicle 1, which is a little longer than wide and longest, 2 and 3 wider than long (2 a little the shortest) 4 a little wider than long, larger than 3. Club ovate, wider than the funicle, its first joint largest. Marginal fringes of the fore wing a little longer than usual. Propodeum latero-dorsad distinctly pubescent. Tarsal joints not long.

Described from one female on a tag in the U.S.N.M., labeled "Lincoln, Nebraska, Webster No. 2142. G. I. Reeves."

Type—Catalogue No. 19922, U.S.N.M., the above specimen plus a slide bearing a fore and hind leg, the head and a fore wing.

Diglyphus maculipennis Ashmead. (Genotype of **Diglyphomorpha** Ashmead.)

Caudal tibial spur single (?), distinct. Mandibles 9-dentate. Antennae 8-jointed, without ring-joint, the club 2-jointed ending conically, not distinctly nipped. Parapsidal furrows complete, delicate. Axillae not advanced. Lateral grooves of scutellum nearly joined around the apex. Propodeum with a distinct median

carina, long, with a lateral obtuse sulcus, and between these, delicate (a few) curved rugæ; spiracles minute. Antennæ inserted a little below the middle of the face. Axillæ and scutellum polished. Head with scattered punctures. Abdomen glabrous, yellowish mesad along basal third or more (dorsal), Club 1 longest. Funicle 1 longest, about twice longer than wide, 4 barely longer than wide, larger than the small pedicel. Blotch on fore wing terminates distad at the apex of the stigmal vein and extends proximad along under most of the marginal. Postmarginal vein a third shorter than the stigmal, in a wing of one specimen; as described in the other. Original description otherwise about correct. From two female types in the U.S.N.M. (a slide bearing a head, wings and a hind tibia).

D. albipes Ashmead, male, is a *Sympiesomorphelleus*, and bears two caudal tibial spurs. Its colour description is correct, but the specimen is a female and is described above.

***Pirene marylandica*, n. sp.**

Female—Length 0.80 mm., excluding the ovipositor, which is extruded for a third of the abdomen's length. Æneous black, the wings hyaline, the tips of tibiæ and proximal four tarsal joints yellowish white; tip of scape distinctly and funicles 1-3 silvery white. Postmarginal and stigmal veins subequal, short, the marginal slender yet somewhat shorter than the submarginal. Scape obclavate; pedicel distinctly longer than wide at apex, longer than funicle 5, which is largest, large but somewhat wider than long; funicles 1-3 like ring-joints (in the *Pteromalidæ*), no transverse-linear ring-joint present), 1-2 subequal, 3 larger, a third the length of 4, which is about half the size of 5. Club large, ovate, with a small terminal nipple, as long as the funicle. Flagellum with scattered minute hairs. Form as in *Parecrizotes* Girault. Body finely scaly, the propodeum smooth, noncarinate. Legs not stout, the caudal femur a little compressed. Parapsidal furrows complete. Mandibles spreading, 4-dentate. Maxillary palpi 2-jointed apparently, the distal joint long.

Described from two females captured by sweeping meadows, September 30, 1915, at Hillmead (Glennedale), Prince George Co., Maryland.

Type—Catalogue No. 19924, U.S.N.M., one of the above specimens on a tag, the head and hind tibia on a slide.

A CLASSIFICATION OF OUR LIMNEPHILID CADDICE FLIES.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The Limnephilidæ are the most prominent family of caddice-flies in temperate regions. Their classification has been largely based on the spur formula; this is undoubtedly valuable, but as it broke down in places, I have tried many times to find other characters. I divided the group into two on the presence or absence of spines on the under side of the last joint of the hind tarsi. Dr Ulmer has brought up a few exceptions. Some I believe are due to the fact that the species is wrongly placed, but in certain *Chætapteryx* it does not hold, but when used in connection with the armature of the front tibiæ, it is decisive. The venation in this family is most distressingly uniform, and I have found little not already utilized. The large bristles back or inward of the ocelli I have used as of generic value; and the development of the strips of bristles on the mesothorax I also consider important. I had hoped to find more characters in the face, and palpi; and think that the vestiture of face may yet be used with success. However, I present this preliminary table in the hope that its use may discover the weak points and suggest new characters. I am loath to make so many new genera; but I believe that all are distinct groups, and future study may show some of them to be better placed as subgenera.

KEY TO THE GENERA OF LIMNEPHILIDÆ.

1. Last joint of hind tarsus with one or more distinct (usually black) spines beneath; tibia I always spined to base (*Limnephilinæ*) 2
- Last joint of hind tarsus without a distinct spine beneath; if one is occasionally present, then the tibia I is not spined to base (*Drusinæ*) 18
2. No prominent macrochætæ behind or inward from ocelli, although sometimes hairs much smaller than macrochætæ; tips of fore wings not obliquely truncate 3
- At least one prominent macrochæta behind or inward from each ocellus, about equal in size to the macrochætæ of the posterior warts; tips of fore wings often obliquely truncate 13

3. Bristles on the veins no longer than those on the membrane, or barely so; membrane not granulate; median part of mesonotum with some bristle-bearing granules; the pronotum rather large; hind wings much excised on outer margin. 4
 Bristles on the veins noticeably longer than those on the membrane; median part of the mesonotum without bristle-bearing granules; hind wings scarcely excised on outer margin.....5
4. Outer margin of fore wings sinuately emarginate; vertex without distinct posterior warts *Glyphotaelius*.
 Outer margin of fore wings not emarginate; posterior warts distinct *Arctæcia*.
5. In hind wings a cross-vein between the subcosta and radius near tip; vertex convex, smooth, posterior warts reduced *Astenophylax*.
 No such cross-vein in the hind wings, vertex flat; posterior warts well developed.....6
6. Vertex, part of thorax, and fore wings with dense appressed hair; basal cross-veins very weak; fore wings not granulate, with a median silvery stripe..... *Hesperophylax*, n. gen.
 (*Platyphylax occidentalis* Bks.)
 Vertex not with dense appressed hair.....7
7. Spurs 1, 2, 2, in hind wings the discal cell does not reach before the median fork; fore wing roughened *Allegophylax*, n. gen.
 (*Platyphylax subfasciata* Say).
 Spurs 1, 3, 3, or 1, 3, 4.....8
8. Spurs 1, 3, 4.....9
 Spurs 1, 3, 3.....11
9. In the hind wings the discal cell reaches plainly before the forking of the median vein.....10
 In the hind wings the discal cell not before the forking of median vein; membrane of fore wings roughened *Eustenace*, n. gen.
 (*Stenophylax limbatus* McL.)
10. Large species; wings very broad; in fore wings the front side of discal cell is slightly concave..... *Stenophylax*.
 Smaller species: elongate wings; in fore wings the front side of discal cell is nearly straight..... *Rhadicoleptus*.

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| 11. | In the hind wings the discal cell but little if any before the forking of the median vein; second apical cell of fore wings wide at base, membrane granulate..... | <i>Pycnopsyche</i> . |
| | In the hind wings the discal cell plainly before the forking of median vein..... | 12 |
| 12 | Large full winged species; membrane not granulate | <i>Clistoronia</i> , n. gen.
(<i>Halesus magnus</i> Bks.) |
| | Small, female short-winged; hairs on the membrane of fore wing as long as those on the veins..... | <i>Psychoronia</i> , n. gen.
(<i>Psilopteryx brevipennis</i> Bks.) |
| 13. | Anal cell not divided at base; spurs 1, 3, 3; fourth apical cell in hind wings broad..... | <i>Platycentropus</i> . |
| | Anal cell divided as usual at base; spurs usually 1, 3, 4..... | 14 |
| 14. | Fifth joint of tarsus I with spines beneath; bristles on veins barely longer than on the membrane..... | <i>Grammotaulius</i> . |
| | Fifth joint of tarsus I without spines beneath; bristles on veins much longer than those on membrane..... | 15 |
| 15. | Hind wings strongly emarginate on outer margin near end of the cubitus; pronotum large and prominent; discoidal cell very long..... | 16 |
| | Hind wings scarcely emarginate at end of cubitus; pronotum less prominent..... | 17 |
| 16. | Fore wings long and slender, tips rounded..... | <i>Anabolina</i> . |
| | Fore wings shorter, tips more acute; pronotum longer | <i>Colpotaulius</i> . |
| 17. | Fourth apical cell in hind wings narrowed at base; mesothoracic strips long; outer margin of fore wings oblique | <i>Limnephilus</i> . |
| | Fourth apical cell in hind wings not narrowed at base; mesothoracic strips short; outer margin of fore wings more rounded | <i>Anabolia</i> . |
| 18. | Bristle-bearing granules scattered over the mesonotum without leaving a median smooth area; pronotum large and prominent; fork 3 in both wings pedicellate; spurs 1, 3, 4..... | <i>Leptophylax</i> . |
| | Bristle-bearing granules arranged in two strips, leaving a smooth median area | 19 |

19. Posterior and anterior anastomoses of fore wings not separated; no macrochætæ behind ocelli; forks 1 and 3 in hind wings pedicellate; spurs 1, 3, 4.....*Homophylax*.
 Posterior anastomosis at least width of a cell before the anterior anastomosis.....20
20. Outer margin of fore wings sinuately excised; macrochætæ behind ocelli; spurs 1, 2, 2.....*Glyphopsyche*.
 Outer margin of fore wings entire.....21
21. Fork 3 absent in hind wings.....22
 Fork 3 present in hind wings.....23
22. Spurs 1, 3, 3; no wart between ocelli and the posterior warts.....*Oligophlebodes*.
 Spurs 1, 2, 2; a distinct wart between the ocelli and the posterior warts.....*Neophylax*.
23. Stigma with a cross-vein at its base, or at least strongly coriaceous.....24
 Stigma without cross-vein, and not especially prominent.....27
24. First apical cell narrowed at base; stigma not very prominent, but with cross-veins at base.....25
 First apical cell broad at base; stigma coriaceous.....26
25. Spurs 1, 2, 4; discal cell of hind wings open.....*Apatania*.
 Spurs 1, 3, 4; discal cell of hind wings closed.....*Allomyia*, n. gen.
 (*Apatania tripunctata* Bks.)
26. Spurs 1, 3, 3; membrane not granulate nor roughened.....*Halesechila*.
 Spurs 1, 2, 2; membrane more or less granulate; hairs on membrane as long as those on the veins.....*Chilostigma*.
27. Each cheek with a prominent spine beneath; first apical cell extending a long way back on the discal cell.....*Allophylax*.
 No such spine on the cheek.....28
28. A large tuft of long hairs at anal base of fore wings; outer fringe on coxa I. longer than width of coxa; antennæ strongly crenulate beneath; ocelli large; tibia I. densely spined to base; bristles of veins not prominent; in hind wings discal cell reaches long before forking of median vein; large species.....*Dicosmæcus*.

- Hair at anal base shorter, less dense, and that on anterior coxæ short; smaller species; bristles of veins usually distinct.....29
29. Spurs 1, 3, 3.....30
- Spurs 1, 2, 2, or 1, 2, 4, or 1, 3, 4.....32
30. Anal cell not divided at base; basal veins obsolete; radius bent at stigma; an ocellar macrochætæ.....*Hylepsyche*, n. gen.
(*Halesus indistinctus* Walk.)
- Anal cell divided as usual, most of basal cross-veins distinct.....31
31. Radius bent at stigma, which is very distinct; membrane not granulate *Halesochila*.
Radius scarcely bent at stigma, which is not especially distinct; no ocellar macrochætæ.....*Drusus*.
32. Spurs 1, 3, 4; no distinct ocellar macrochætæ.....33
- Spurs 1, 2, 2, or 1, 2, 4.....35
33. Fork 3 in fore wings acute at base, sometimes pedicellate *Algonquina*, n. gen.
(*Parachiona parvula* Bks.)
- Fork 3 in fore wings not acute, but reaching before the anastomosis.....34
34. Anastomosis is placed before end of the subcosta; the apical cells very long *Anisogamus*.
Anastomosis beyond end of the subcosta, apical cells normal *Apolopsyche*, n. gen.
(*Stenophylax minusculus* Bks.)
35. Ocellar macrochætæ present; spurs 1, 2, 4; wings rather narrow, first fork reaches a long distance back on discal cell *Ecclisomyia*.
Ocellar macrochætæ absent, spurs 1, 2, 2, or 0, 2, 2; membrane granulate.....36
36. Discal cell shorter than the pedicel or barely longer *Polamorites*.
Discal cell much longer than its pedicel.....37
37. Radial vein scarcely bent at the stigma, wings less broad *Ironoquia*.
(*Chaetopterygopsis parvula* Bks.)
- Radial vein strongly bent at the stigma; wings broad *Chilostigma*.

NOTES ON THE GENERA

Arctæcia—Includes *A. consocia* Walk. The genus *Philartctus* is very close and perhaps identical.

Hesperophylax and *Allegophylax*—These were formerly included in *Platyphylax*, but, as already noted by McLachlan and Ulmer, not congeneric. *Allegophylax* also includes *P. lepida* Hag.

Eustenace—Includes also the *Stenophylax gentilis* of McLachlan.

Rhadicoleptus—Our *Asynarchus fumosus* and *A. flavicollis* will go in Wallengren's genus, and are quite different in appearance from the typical broad winged *Stenophylax*.

Asynarchus—The type species, *A. fusorius*, will run to *Anabolia*, and I see little reason for separating it; various other species, *iteratus*, *amurensis*, etc., will also go to *Anabolia*, but *A. cænosus* runs to *Stenophylax*; it should form another genus.

Clistoronia and *Psychoronia* include each only a single species.

Allomyia includes but one species.

Drusus—In this I include *Halesus sparsus* Bks. from Newfoundland.

Halesus—I do not find any true representatives of this in our fauna; in the above table it would run out near *Platycentropus*, having ocellar macrochætæ, and 1, 3, 3 spurs; but the anal area is normally divided.

Ecclisomyia—The European *Ecclisopteryx* has spurs 1, 2, 3; first fork not so far back on discal cell, and no ocellar macrochætæ.

Algonquina, type *Parachiona parvula* Bks., I propose for several species which I formerly kept in *Parachiona*, but the latter is quite different.

Ironoquia—Includes only the one species I have previously placed in *Chaetopterygopsis*. In this latter genus there are ocellar macrochætæ. The genera *Heliconius* and *Anisitella* are really *Chaetopterygopsis* with a variation in spur formula; they have the same peculiar fore wings, and also ocellar macrochætæ. *Catadice* has no ocellar macrochætæ.

Limnephilus—This genus contains by far a larger number of species than any other genus in the family, and several are rather aberrant and show affinity to *Anabolia*. *Goniotauius* should be maintained, but I have not been able to find characters, except that the ocellar macrochætæ are nearer to each other than in the true *Limnephilus*.

TWO DIPTERA OF THE GENUS RHAMPHOMYIA FROM COLORADO.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The large and varied genus *Rhamphomyia* (Empididæ) is known to be of considerable antiquity, no less than twelve species having been described by Meunier from Baltic Amber. It is therefore not surprising to find a species in the Miocene shales at Florissant.

Rhamphomyia sepulta, n. sp.

Length 6 mm.; length of wing 5.65 mm.; wings brownish, no stigmatic cloud; head, thorax and legs black; abdomen slender, pallid; eyes well separated on vertex (the specimen apparently a female); antennæ with third joint elongate, but not so long and slender as in the amber species *R. errabunda*, *ædaloides* and *obtusa*. Venation of wings normal for the genus, the third longitudinal vein simple; anal lobe large and abrupt, the lower margin before the lobe with small bristles as in recent species; second anal vein continuing in a straight or nearly straight line apicad, not deflected downward at the basal corner of the anal lobe. The following measurements are in microns: Level of humeral cross-vein to separation of second and third veins, 720; end of second vein to end of third (in a straight line), 640; discal cell on first basal, 240; discal cell on second basal, 304; discal on second posterior, 80; discal on third posterior, 320; upper side of discal, 800. Miocene shales of Florissant, Colorado, Station 13 (*S. A. Rohwer*).

I take occasion to describe also a living species from a high altitude.

Rhamphomyia calvimontis, n. sp.

Male—Length 6 mm.; length of wing 7.5; shining black, with long black hair on head and dorsum of thorax; the face has a little black hair, a character of *Neocola* Coq., but the species does not seem otherwise allied to the type of that genus; sides of thorax grey-pollinose; abdomen with glistening creamy-white hair, a stiff band of bright ferruginous hair on the ventral surface sub-apically (0 in figure); wings grey. Metapleural bristles present. Legs entirely black. In Coquillett's key (Proc. U. S. Nat. Mus., XVIII, pp. 410-418) it runs next to the Californian *R. duplicis*. It is not identical with any of the species since described from

Alaska. Compared with *R. duplicis*, it is larger; eyes contiguous above, but the facets practically equal in size; antennæ black,

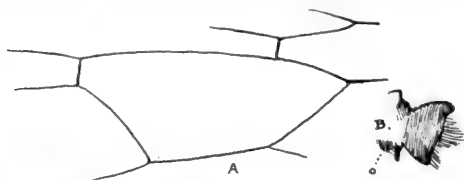


Fig. 2—A. *Rhamphomyia sepulta*: discal cell.

B. *Rhamphomyia calvimontis*: lateral view of end of male abdomen.

third joint sub lanceolate, the style about half its length; proboscis over 2 mm. long; thorax without dorsal pollinose vittæ; scutellum with numerous (many more than six) long black hairs; front and

hind basitarsi large and hairy, middle ones small; knob of halteres dark brown. The second anal vein, differently from the fossil, is abruptly deflected downward at the basal corner of the anal lobe. In Bezzi's key of South American *Rhamphomyia* (1909) this falls nearest to *R. limbipennis* Bezzi. Above timber-line, in the Arctic-Alpine zone, Baldy Mtn., Boulder County, Colorado, July 24, 1915. (Cockerell.)

I take occasion to correct two misprints in former papers on Diptera. In Can. Ent., 1915, p. 316, read *Chironomus guatemaltecus*; and p. 351, in fourth line of description, read greyish instead of greenish.

NEW SPECIES OF EUTETTIX AND PHLEPSIUS (HOMOPTERA).

BY E. D. BALL, LOGAN, UTAH.

The genus *Eutettix* is one of the most interesting of the groups of leaf-hoppers in the diversity of food plants of the different species, and at the same time in the constancy with which a given species is confined to its host.

At the time the writer published the review of this genus little was known of the life-histories or food plants of a number of western species of the *strobi* group. From circumstantial evidence it was thought that *saucia* would probably be found to occur on *Eriogonum*. Since that time this species has been found in some numbers on a species of this plant in California. The type specimens of *columbiana* described below were taken from

April, 1916

another species of this same genus of plants. The type of *nevada* from still another, while the type of *rubida* came from a location in which a species of *Eriogonum* grew and the colour of the plant would harmonize better with the striking shade of red of the insect than any other plant there. In addition to these records, *pannosa* has been found to be strictly confined to a shrubby species of *Eriogonum* on the hills of California. Another record which again shows diversity in food plants is that of *osborni*, which has been found by Van Duzee to be strictly confined to a species of *Tamarix* in California.

***Eutettix columbiana*, n. sp.**

Resembling *perelegantis* and *mildredæ*, but lighter in colour and lacking the definite shades of orange and olive. Form of *saucia* nearly. Length: ♂ 5 mm.

Vertex roundly right angled, the apex blunt, disc slightly sloping, depressed before the margin. Pronotum as in *saucia*, lacking the definite gibbous appearance of *perelegantis*. Venation as in *saucia*.

Colour ivory white, with a pale tawny and olive brown saddle with black points. Vertex creamy, with traces of four brown points on the margin, a pair of rather large irregular spots on the posterior submargin a little more than their own width from the eyes. Face and below creamy. Pronotum ivory, mottled with olive and brown, omitting the lateral and most of the anterior margin; two definite black spots behind the inner angle of either eye and two irregular ones nearer the median line. Scutellum creamy, the lateral angles olive brown. Elytra ivory sub-hyaline, with an olive brown saddle as in *saucia*, but lighter or wanting along the sutures, and with three definite dark points extending almost to the claval suture, apical cloud reduced to spots on third and fourth nervures.

Genitalia of male as in *saucia*.

Described from two males from Wenatchee, Washington, collected by the writer. From *saucia* this species can be separated by the definite black spots on the pronotum, from *perelegantis* by the structure of head and pronotum.

Eutettix nevada, n. sp.

Form of *saucia* nearly, with a similar saddle. Colour of *texana* or a pale *pannosa*. Length: ♀ 4.6 mm.

Vertex similar to *saucia*, slightly less sloping, pronotum very flat, much less arched than in *saucia*. Front very full, roundly right angled with vertex. Venation as in *pannosa*.

Colour creamy white, mottled and washed with pale olive brown. Vertex creamy, traces of four brown spots on anterior submargin, three large, slightly irregular mottled areas along the posterior margin, the median one nearly rectangular, the lateral ones nearly circular. Pronotum mottled with pale brown, omitting the lateral margins and three narrow stripes on the disc. Scutellum mottled with pale brown, with two stripes. Elytra milky with the saddle of a pale mottled brown, omitting an irregular sutural stripe. The ivory margin along the claval suture is narrow and regular as in *pannosa*, without the posterior enlargement, as in *scitula*, and without the usual distinct dark margins. The saddle extends to costa, but the apical cloud is reduced to a few reticulations. A number of strong reticulations on basal area of the corium below the saddle.

Genitalia: Female segment rather long, slightly rounding posteriorly, with a slight, rather broad strap-shaped projection, which is dark-lined back on to the segment.

Described from a single female collected at Wells, Nevada, by the writer. The short head will separate this species from *pannosa*, while the strongly margined saddle renders it quite distinct from *saucia*. Its mottled appearance suggests *texana*, but that species does not have a saddle.

Eutettix rubida, n. sp.

Form of *pannosa* nearly. Shorter and broader with short apical cells. Colour and pattern of *saucia* nearly. Length: ♀ 4 mm.

Vertex and pronotum nearly flat as in *pannosa*. Vertex broader than in that species and equally long, the apex slightly obtusely angled. Whole margin inclined to be thin and slightly upturned before the depression. Elytra very broad and short.

Venation similar to *saucia*, except that the apical cells are only one-half as long. The central apical cell equally broad and long.

Colour red-brown and ivory. Vertex testaceous, the margins ivory, with four large nearly quadrangular spots before the depression. Pronotum densely mottled with rusty brown, omitting the lateral margins. Scutellum rusty brown. Elytra ivory, with a dark rusty brown saddle of the *saucia* pattern, the line next the claval suture nearly straight and not dark margined, the apical cells densely clouded.

Genitalia: Female segment moderately long, nearly truncate, with a broad, short, bilobed projection.

Described from a single female taken by the writer in Logan Canyon, Utah, altitude 6,000 feet. This is a strikingly distinct species, in the broad short form, short apical cells and long flat vertex.

***Eutettix insana* var. *coronata*, n. var.**

Slightly smaller and paler than *insana*, with a variable number of black spots. Length 3 mm.

Vertex and pronotum shorter and broader than in *insana*. Elytra shorter and inclined to be more flaring.

Colour white as in *Phlepsius denudatus*, rather than green, as in typical *insana*, with a much smaller number of the "peppered" dots and a variable number of black spots. These black spots including all or part of the following: A pair of slightly oblique lines behind the middle of the vertex, six dots in an arcuated line on the anterior submargin of pronotum, the outer ones usually largest and located just behind the inner angle of the eye, four large black spots in a slightly curved line on the anterior part of the scutellum, two minute points on the lateral margins of the scutellum, four pair of equidistant spots along sutural margins of elytra, the third and largest pair at the claval apices, four spots on each elytron in an approximately straight line between the posterior angle of the pronotum and the second costal nervure, the first two in this row slightly in advance of the corresponding sutural spots, the second two opposite. These spots are all variable in size, and some are often wanting.

Described from two females and two males from Mojave, California, collected by the writer. This is a much smaller and

paler form than typical *insana*, and with the definite spotting would not be easily recognized as belonging to that species.

Eutettix (Mesamia) coloradensis var. **visalia**, n. var.

Form of *coloradensis*. Pale fulvous, with light flecks on elytra.

Colour and general appearance of *johnsoni*, except for the black points on vertex. Vertex and face pale fulvous, with the line wanting or only slightly indicated in tawny. Pronotum and scutellum pale fulvous without definite markings. Elytra with the claval areas pale fulvous more or less flecked with oblong milky spots. Corium fulvous sub-hyaline, the nervures tawny and usually a tawny spot between the two cross nervures and faint dusky spots in the centres of the apical cells.

Described from two females and two males from Visalia, California, collected by the writer on *Artemisia dracunculoides*. If this had not been the food plant to which *coloradensis* is strictly confined this variety would scarcely have been referred to this species, as the colour is so strikingly different. The finding of this colour variety indicates a closer relationship between the *nigrodorsum* and *vitellina* groups than was even suspected when they were placed in the same subgenus.

Phlepsius loculatus, n. sp.

Resembling a diminutive *costomaculatus* in appearance, but much smaller. White, with two stripes and coarse elytral reticulations dark. Length 3-3.5 mm.

Head with the eyes much wider than pronotum; vertex narrow, slightly longer than its basal width, as long as pronotum, slightly obtusely angled with the apex bluntly rounding, disc nearly flat, anterior margin forming an acute angle with the front; front long, narrow, wedge-shaped. Elytra long, narrow, venation as in *costomaculatus*, the apical cells extremely long.

Colour dark brown or black and white, giving an ashy gray appearance. Vertex milky white or sometimes suffused with yellow, two pair of brown dots on the extreme margin against the apex; a pair of slightly oblique, elongate, egg-shaped dark spots extending from just behind the anterior pair of spots to posterior margin, each dark spot containing two light spots in the shape of an oblique crescent above a dash. Sometimes the dark spots

coalesce with the outer dots when the whole appears as a pair of stripes, in which case the crescent and dash fuse to form a question mark. Pronotum milky, with four broad, mottled, dark brown stripes, the outer pair definite and touching the inner angle of the eye, the inner pair irregular and often fading out posteriorly. Elytra milky with the most of the nervures and a few coarse reticulations as in *costomaculatus* almost black

Genitalia: Female segment short, posterior margin slightly indented in the middle, pygofer extremely long and almost parallel margined. Male valve triangular, plates together equilaterally triangular.

Described from four females and four males from St. George, Utah, and Mojave, California, collected by the writer. This species is quite puzzling in character; in elytral characters it is close to *costomaculatus*, but differs radically in the extremely wide head. In size it is unique in the genus, but in *Deltocephalus* where the occasional second cross nervure would, if considered, place it, it would seem at home. It is, however, unquestionably related to the other forms mentioned. The white markings in the black spots are a striking and very distinctive character.

Phlepsius stellaris, n. sp.

Larger and stouter than *loculatus*, which it resembles in form and structure, resembling *denudatus* in the light colour and lack of reticulations. Creamy white, with two star-like spots on vertex. Length: ♀ 4 mm.

Head broad as in *loculatus*, vertex shorter and broader, obtusely rounding, scarcely longer on middle than against the eye, two-thirds the length of the pronotum. Front shorter than in *loculatus*, forming a wider angle with vertex. Elytra long, narrow, venation as in *costomaculatus*, but obscure.

Colour creamy white, the ocelli and four equidistant spots on vertex margin between these dark, a pair of irregular star-shaped spots on the anterior disc of the vertex, one ray of each star, including the outer marginal spot, on either side and another touching the eye; a spot on either side of scutellum at base, extending forward under the semitransparent pronotum, and often a dot or two behind the eyes. Elytra creamy, the nervures showing

a trace of fulvous, rather obscure. Face and below creamy, a pair of brown arcs on either side of the front between the antennal sockets, attached to a brown cloud in the centre, forming a spider-like marking on face.

Genitalia: Female segment broad and short, almost parallel margined with a slight median notch.

Described from four females from St. George, Utah, and vicinity collected by the writer. This species, although still small for the genus, is nearly twice as large as *loculatus*, to which it seems to be allied. The white ground colour, with the black stars, render it strikingly distinct.

A NEW *PHYSOTHRIPS* (THYSANOPTERA) FROM
UGANDA, WITH A NOTE ON *PHYSOTHRIPS*
ANTENNATUS BAGNALL.

BY J. DOUGLAS HOOD, U. S. BIOLOGICAL SURVEY, WASHINGTON, D. C.

The new species here described from a unique female was received from Dr. Henry J. Franklin, of the Massachusetts Agricultural Experiment Station, and had been included with a number of specimens of *Physothrips antennatus*, collected by Mr. C. C. Gowdey at Kisube, Uganda.

***Physothrips antennatus*, Bagnall.**

1914.—*Physothrips antennatus* Bagnall, Ann. Mag. Nat. Hist., ser. 8, Vol. XIII, p. 23.

1914.—*Physothrips antennatus* Karny, Zeitschr. f. wiss. Ins.-biol., Bd. X, p. 365.

The brief original description of this species may be amplified as follows:

The median dorsal length of the head is about 0.7 the width across eyes, and about three-fourths the length of the prothorax; the cheeks are gently rounded, converging to base. The pronotum is finely and deeply striate, with a pair of nearly smooth, foveate areas behind middle; hind margin with three pairs of bristles between the two long pairs, the mediad pair larger; disk with about 25 small bristles on each side. Mesonotum slightly more closely transversely striate than the pronotum; metanotum sub-

concentrically striate. Wings brown, basal fourth much paler, gray. Segment 8 of abdomen unarmed, without the usual comb-like fringe on posterior margin.

***Physothrips xanthocerus*, sp. nov.**

(Fig. 3, a and b.)

Female (macropterous).—Length about 1.1 mm. Colour dark blackish brown, nearly black, with antennal segments 3-8, all tarsi, and distal half of all tibiae, light lemon yellow; fore wings brown, pale gray in basal fourth.

Head about three-fourths as long as greatest width, sides rounded and converging to base; occiput with several anastomosing

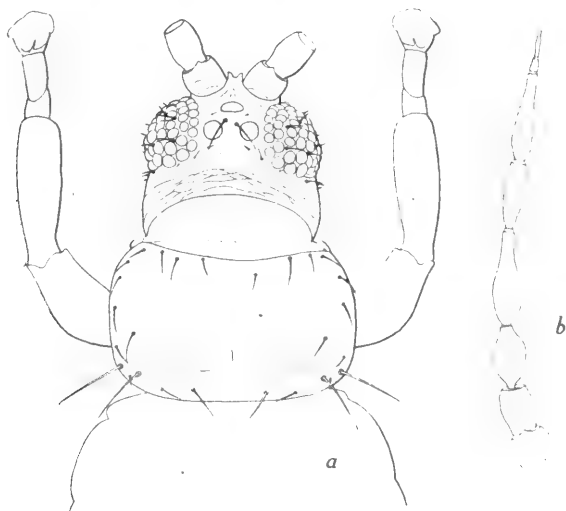


Fig. 3.—*Physothrips xanthocerus*, n. sp., female, holotype; b, antenna.

lines; interocellar bristles less than one-fourth as long as head, situated well within the ocellar triangle; a pair of smaller bristles in front of, and a second pair behind posterior ocelli; postocular bristles small, three pairs in profile at posterior angles of eyes. Eyes about 0.6 as long as head and slightly narrower than their interval. Ocelli equidistant, subequal in size, posterior pair opposite middle of eyes. Antennae about three and one-fourth times as long as head, form of segments shown in figure, unusual

in that fourth segment is very long and produced distally into a narrow stem; segments 1 and 2 nearly concolorous with head, 3-8 lemon yellow, the three distal segments shaded with gray.

Prothorax about 1.1 times as long as head and about 1.7 times as wide as long; pronotum smooth, absolutely without sculpture; two strong dark bristles at posterior angles, and between these along posterior margin two smaller pairs, the inner larger; anterior and lateral margins each with about five pairs of small, subequal bristles, in addition to a similar pair at the anterior angles and a slightly stronger pair almost directly in front of the inner long pair at posterior angles; no other pronotal bristles. Wings of fore pair about fifteen times as long as width at middle, dark gray-brown in distal three-fourths, basal fourth pale gray, slightly clouded basally; costa with about 28 bristles; anterior vein with four pale bristles in a basal group, followed immediately by another series of 13 or 14, and then by two, well separated, near apex; posterior vein with 16 or 17, commencing just beyond the first bristle in the long series of anterior vein.

Abdomen of normal form, with a few very faint anastomosing lines of sculpture on basal segments; segment 8 unarmed, without the usual comb-like fringe on posterior margin; segment 10 not divided above, though irregularly weakened along dorsal line near apex; abdominal bristles long, strong, brown.

Measurements of holotype: Length 1.08 mm.; head, length along median dorsal line, 0.105 mm.; width, 0.140 mm.; prothorax, length 0.114 mm.; width 0.194 mm.; pterothorax, width 0.255 mm.; abdomen, width 0.300 mm.

Antennal segments.....	1	2	3	4	5	6	7	8
Length (μ).....	29	36	50	75	53	67	11	22
Width (μ).....	32	26	26	23	16	17	7	5

Total length of antenna, 0.343 mm.

Described from one female collected by C. C. Gowdey, at Kisube, Uganda, on coffee (No. 3582).

Closely allied by the elongate fourth antennal segment to *Physothrips antennatus* and *Ph. antennalis*, but differing from both in the pale antennæ, and from the former, at least, in the smooth, sparsely spinose pronotum.

THE LIFE-HISTORY OF *LEUCOBREPHOS BREPHOIDES* WALK. (LEPIDOPTERA).*

BY ARTHUR GIBSON AND NORMAN CRIDDLE.

Leucobrepbos brephoides Walk. was for several years known in Canadian collections as *L. middendorfi* Men. It was not until 1907† that the late John B. Smith corrected the error and stated that the former "is the only species thus far known to inhabit North America." In the Entomological Record, for the years 1901 and 1903, the species is recorded under the name *middendorfi*, which name is also used by Fletcher in *The Ottawa Naturalist*, XXIII, 67.

We have been much interested in the habits and life-history of this interesting and rare moth. In 1903, the junior author forwarded to the late Dr. James Fletcher some eggs of the species, and these and the larvæ were then studied, as time permitted, by Fletcher and the senior author. In 1915, Mr. F. H. Wolley-Dod forwarded, to Ottawa, 35 eggs, which had been obtained at Midnapore, Alta., on April 5-10. These latter gave us an opportunity of studying, more definitely, the preparatory stages. The notes made by Fletcher, in 1903, were incomplete, but such as are of value we include herewith.

The Egg.—0.5 mm. in diameter; 0.9 mm. in length; oblong, rounded at both ends; indistinctly longitudinally striate; densely granulate-punctate, the granules acute and irregularly connected to form faint transverse ridges.

When received from Mr. Dod (April 20) the ova were darkened preparatory to hatching. Fletcher, in ms., states that the colour of the egg is "pinkish-ochre at first, turning a leaden gray before hatching." The egg shell is opalescent; the larva emerges through a rather large, ragged, hole at one end.

The eggs which were sent to Fletcher in 1903 were laid in confinement at Aweme, Man., on April 15-16. Fletcher's ms. note reads: "Laid on the leaf scars of young shoots of *Populus tremuloides*, above the scar, and deposited flat on their sides, 2 or

*Contribution from the Entomological Branch, Department of Agriculture, Ottawa.

†Canadian Entomologist, XXXIX, 370.

April, 1916

3 sometimes at a single scar." The junior author has frequently found the eggs under natural conditions near the tips of the branches of Aspen Poplar, the place selected being the scar left by the fallen leaves of the previous autumn. Oviposition has been noted high up among the terminal twigs of trees, thirty feet or more in height; at other times the female moths were observed to choose a tree of about five feet in height. As a rule, not more than one egg is deposited on a leaf scar. From close observation, made on three occasions, a single female moth undoubtedly deposits several eggs on the same tree. In one instance the junior author noticed a female visiting at least a dozen different situations on the same tree for the purpose of oviposition. The largest number of eggs obtained from a single female was 135. This individual was collected at Aweme, Man., on 14th April, 1903, and in confinement continued ovipositing for six days.

The eggs which were deposited at Midnapore, Alta., on April 5-10, mostly hatched at Ottawa, on April 21 and 22.

DESCRIPTION OF LARVAL STAGE.

First Instar.—The newly-hatched larva is 2.0 mm. in length and dark-green in colour. Head 0.3 mm. wide, rounded, somewhat quadrate, darker than body, of a greenish-brown shade, margined posteriorly with brown; ocelli black. No markings on body; lateral area and dorsum of first thoracic segment, paler. Tubercles pale brownish, indistinct, circled with sordid whitish; setæ short, stiff, very conspicuous. Spiracles brown. First three pairs of prolegs aborted. Feet concolorous with body. After feeding, the larva is of a greenish-gray colour.

Second Instar.—Length 5.5 mm. Head 0.6 mm. wide, greenish-white, with dark green blotches, particularly on cheeks; ocelli black; mandibles pale reddish. Body marked longitudinally with pale white stripes as follows: addorsal stripe; subdorsal stripe wider than addorsal stripe; lateral stripe, just above tubercle iii; wide stigmatal band enclosing tubercles iv and v (the skin here is conspicuously wrinkled); and a rather indistinct medio-ventral stripe. Ventral surface distinctly glaucous. Tubercles brown. Spiracles dark brown, white in centre. Prolegs concolorous with venter. As the stage advances the skin of dorsum, particularly

on posterior segments, assumes a yellowish-green tint. The wide stigmatal band is the most conspicuous marking on the body.

Third Instar.—Length 8 mm. Head 0.9 to 1.0 mm. wide. The larva in this instar is similar in appearance to the second instar. The venter is decidedly glaucous. All the stripes are distinct and white in colour. The stigmatal band is wide and conspicuous, and more or less tinged with yellow. Length before third moult 10.5 mm.

Fourth Instar.—Length 12 mm. Head 1.5 to 1.7 mm. wide. Body dark velvety green, later becoming a paler green. The addorsal and lateral stripes irregular but distinct; stigmatal band very conspicuous, extending to end of anal flap, the edges being even. Medio-ventral stripe inconspicuous. All markings white. Tubercles circled with white. Venter distinctly glaucous. Length before fourth moult 15 mm.

Mature larva—Fifth Instar.—Length 18 mm. Head 2.2 to 2.5 mm. wide, rounded, somewhat quadrate, depressed at vertex; smooth, paler green than body and of a glassy appearance; clypeus high; ocelli black, between the ocelli the skin is whitish, like enamel; labrum also whitish; mandibles reddish-brown. Body cylindrical, lettuce green* in colour, with a yellowish reflection, excepting venter, which is glaucous. The folds between the segments are yellowish. The addorsal stripe, the subdorsal stripe and the lateral stripe are thinner than in previous instars and hence are not so distinct. In colour they are now decidedly yellow. The wide, bright pale-yellow stigmatal band is very conspicuous from the back of the head to the end of the anal flap, where it narrows. The two dorsal and the lateral stripes are more or less broken and sinuous in outline. The lateral stripe is distinctly wavy on the thoracic segments. Medio-ventral stripe now distinct, of a milky white colour. Spiracles whitish, ringed with black. Tubercles minute, circled with pale yellow, each bearing a short black hair. On abdominal segments tubercle iii is nearly midway between the lateral line and the spiracle, and immediately above the spiracle, excepting on segments 6, 7, 8, 9 and 12, where it is noticeably

*Ridgeway's Colour Standards and Colour Nomenclature, 1912.

anterior. Tubercle iv, behind the spiracle, v almost immediately below the spiracle, both enclosed in the stigmatal band, the former near the upper edge and the latter near the lower edge. Thoracic feet pale, somewhat translucent; prolegs concolorous with sub-ventral area; crotchets slightly pinkish; legs on segment 10 normal, on segments 9, 8 and 7 much reduced, the latter being the smaller and decidedly rudimentary. Length of full grown larva at rest 26 mm.

The Pupa.—Length 12-14 mm.; width at widest part 5 mm. When newly formed green, soon changing to pale brown, and later to dark reddish-brown; thorax and wing-covers darker, almost blackish, wrinkled; abdominal segments coarsely pitted on anterior three-quarters and minutely pitted on posterior one-quarter. Spiracles pale yellowish in centre. Cremaster two-spined, the spines stout and arising from either side, curved outwardly from towards the tip, and forming, almost, a perfect letter U.

Food Plant.—All larvæ reared at Ottawa were fed on the foliage of Aspen Poplar, *Populus tremuloides* Michx. This tree is the only food plant upon which we have found the larvæ feeding under natural conditions.

HABITS OF LARVA.

During the different instars the larvæ spun considerable silk. Under natural conditions, at Aweme, Man., they have been frequently observed hanging at the end of a silken thread spun from the branches of Aspen Poplar. This habit and that of looping when walking corresponds well with many of the Geometridæ. A ms. note by Fletcher reads as follows: "A semilooper, the three first pairs of abdominal legs not used in walking, although apparent. When at rest the young caterpillar rests as a geometer on the anal and fourth pairs of abdominal prolegs, with the front of the body raised. The larvæ have the same habit as *Brephos infans* of catching several leaves tightly together with single threads, and when resting, either lie along the petiole or inside a curl of a young leaf. When they began to feed, they attacked the edge of a leaf or ate straight into the surface either above or below."

When mature the larvæ entered the earth to pupate. The larvæ studied in 1915 were full grown on May 15 and 16. By May 20 all had changed to pupæ. The earthen cell is slight.

On June 13, 1902, two larvæ in the last instar collected at Aweme, Man., were received at Ottawa. On the earth in the breeding jar small pieces of bark and rotten wood were placed to see if the larvæ would use such for pupation. Both specimens, however, entered the earth (June 14) and there transformed to pupæ (June 17).

HABITS OF THE ADULT.

The moth of *Leucobrepbos brephoides* is a sun-loving creature, being most active between the hours of 11 a.m. and 3 p.m. It is among the earliest of the moths to appear in spring. It has been collected in Manitoba as early as March 18 and as late as May 11. The time of emergence from over-wintering pupæ is, of course, largely governed by the prevailing climatic conditions. It is not unusual to see the moths on the wing before the snow has all disappeared. Oviposition habits have already been referred to. Owing to a quick, jerky, flight and habit of darting upwards at the least sign of alarm, and also in view of the fact that the moth has a marked colour resemblance to the surrounding landscape, it is difficult to follow with the eye and individuals, therefore, are extremely hard to catch. Its remarkably acute eyesight and habit of flight undoubtedly account for its rarity in collections.

Experiments with the usual "sugar" mixtures, in daytime instead of at night, indicated that such are of no value to attract the moths. They have, however, on several occasions been induced to alight upon putrid flesh, which had been placed on the ground. The moths also seek moisture and are often found frequenting muddy roadways in the vicinity of aspen woods.

Distribution.—Midnapore, Alta., April 12-19, 1914 (Tams), April 7-10, 1915 (Dod and Tams); Saskatoon, Sask., April 11, 1913 (Willing); Beulah, Man., April 16, 1903 (Dennis); Aweme, Man., collected almost every year since 1901, earliest date March 18, latest date May 11 (Criddle Bros.); Rounthwaite, Man. (Marmont); Winnipeg, Man., April 17, 1910 (Wallis); Hymers, Ont., April 9, 1908 (Dawson); Mayo River, Yukon Territory, April 16, 1907 (Davidson); Portage at Grand Falls, Hamilton River, Labrador, May 12, 1894 (Low); Jenerk, Klutlan Glacier, elevation 5,500 feet, 141 Meridian, North of Mt. Natazhat, May 2, 1913 (Nesham).

In addition to the above localities the species has been recorded by Walker* from "St. Martin's Falls, Albany River, Hudson's Bay (Dr. Barnston)"; "Fort Confidence (Sir J. Richardson)"; by Grote† from "Yukon River, mouth of Porcupine River (R. Kennicott)"; and ‡ "Racine, Wis. (P. R. Hoy)"; and by Zeller†† from "Fort Resolution am Sklaven-see (Great Slave Lake) Westlich von der Hudson's Bay unter dem 61° N. Br. (Baron Osten Sacken).

*C. B. Mus. Het. XI, 702, 1857.

†Proc. Ent. Soc. Phil. III, 74, 1864.

‡Bull. Bkln, Ent. Soc. III, 30.

††Stett., Ent. Zeit. XXIV, 136.

NEW SPECIES OF MICROLEPIDOPTERA.

BY ANNETTE F. BRAUN, CINCINNATI, O.

Coptodisca magnella, n. sp.

Palpi and lower part of face silvery white; head with a decided pale golden lustre. Antennæ fuscous.

Thorax and basal half of fore wings pale silvery gray, almost white; extreme costa on basal half black. Apical half of fore wings golden yellow; a triangular silvery white spot at the apical third of the costa edged with black on both sides; a similar but narrower spot a little anterior on the dorsal margin, also edged with black on both sides. The outer edge of the dorsal spot forms part of the dark patch of scales which extend from it to the dorsum and termen. This patch is often pale gray and ill-defined, except at its outer edge, which is marked by a row of dark scales along the termen. It is separated from the dark margins of the costal silvery spot by the golden ground colour. Beyond the costal spot and almost parallel to its outer margin is a streak of black scales. Apical patch wedge-shaped, formed of a circular velvety black spot, and the terminal row of black scales immediately beyond it. It is preceded and edged on either side with one or two silvery white scales; and well separated from the dark dorsal patch by the golden yellow ground colour. Cilia whitish yellow, with an apical black pencil extending outward from the apical black patch. Hind wings gray.

Legs yellow, except the fore tibiae and all the tarsi, which are fuscous. Abdomen fuscous above, yellow beneath.

April, 1916

Expanse: 5-6 mm.

Nine specimens, Lancaster, Ohio, bred from mines on leaves of huckleberry, *Gaylussacia baccata* (Wang.) Koch. The mine is of the usual character in the genus, starting as a narrow linear mine which abruptly enlarges into a semitransparent blotch (10 by 3 or 4 mm.). The elliptical case is attached as usual by a silken band to a leaf or twig. Mines which were collected August 21, 1914, produced imagos May 10-17 of the following year.

This is the largest species of the genus thus far described. Apart from its size, it may be distinguished from other species chiefly by the pale basal half of the fore wings and the fact that the dark dorsal patch never extends nearer the costa than the apex of the dorsal silvery spot, and therefore the ground colour extends without interruption between the silvery spots to the termen beneath the apical spot.

It is most closely related, particularly in character of mine and shape of pupal case, to *C. ostryæfoliella* Clem., of which there seems to be no published description. To supply this the following brief description of *C. ostryæfoliella* is given.

Coptodisca ostryæfoliella Clemens.

Antennæ fuscous; head with other appendages pale silvery gray.

Thorax and fore wings in the basal half pale silvery gray; apical half of fore wings yellow. At the apical third is a triangular silvery white spot dark margined on both sides. A little anterior on the dorsal margin, a similar but smaller and shorter spot narrowly separated from the costal spot by the ground colour or by the costal-wards and proximal extension of the dark dorsal patch lying beyond the dorsal white spot. This dark patch extends nearly or quite to the apical fan-shaped black spot, which is preceded and edged as usual by one or two silvery scales, and from which the usual black pencil extends outward into the cilia, which are whitish. Preceding the apex in the costal cilia is an almost perpendicular streak of black scales. Hind wings pale gray.

Abdomen gray above, silvery beneath. Legs silvery with dark fuscous tarsi.

Expanse: 4-4.2 mm.

Bucculatrix crescentella, n. sp.

Face whitish, tuft on the vertex whitish, more or less intermixed with ochreous or dark brown hairs.

Fore wings usually brown; sometimes paler, almost buffish ochreous. A whitish streak, sharply defined in dark specimens, extends from the base for one-half the wing length above the fold; immediately beneath the ground colour is somewhat darkened. At the middle of the costa is a narrow oblique curved white streak, concave outwardly; beyond it a less oblique white streak pointing toward the tornus; between these streaks the ground colour is a darker brown. On the middle of the dorsum is a half crescent-shaped dark brown spot, bordered before and behind with whitish. A triangular white spot immediately precedes the apex and lies above an irregular black spot, beyond which a line of dark scales crosses the apical cilia. Hind wings gray, brown or ochreous tinged.

Legs yellowish, marked with fuscous; hairs on posterior tibiae pale ochreous.

Expanse: 7-9 mm.

Described from a series of bred and captured specimens. This is one of the commonest species around Cincinnati; it occurs also at Toronto, Canada. Mines may be found plentifully on species of *Compositae* belonging to several genera (*Aster* spp., *Solidago* spp., *Erigeron* spp.). The larva makes a trumpet-shaped mine, gradually increasing in diameter and marked by a central line of frass. On rare occasions it deserts one mine to form another, but is at no time an external feeder. The cocoon of the usual *Bucculatrix* type is a white elongate ribbed structure.

Lyonetia candida, n. sp.

Face, palpi and antennal eye-cap silvery white; antennal stalk gray. Tuft on the vertex white, with a few blackish hairs, especially behind.

Fore wings shining pure white, except in the apical part. Just before the costal cilia is an oblique triangular grayish streak, apparently formed by the confluence of two narrower streaks, which are sometimes indistinctly separated from one another by white ground colour. This is followed by three perpendicular, slightly curved black streaks in the cilia preceding the round black

apical dot. The last of these meets a similar black streak projecting into the cilia below the apex. The oblique triangular costal streak meets in the middle of the wing the apex of a grayish V-shaped mark placed at the tornus. The space between the arms of this mark is sometimes suffused with gray. A yellow patch occupies the apex of the wing and is margined along the termen by blackish scales. A black streak projecting out into the apical cilia from the apical dot is crossed at right angles by a nearly straight black line. Hind wings and cilia gray.

Abdomen gray, white beneath. Legs whitish, tarsal segments tipped with black.

Expanse: 9-10.5 mm.

Three specimens, Santa Cruz Big Trees, Calif., the larvæ mining leaves of Azalea, *Rhododendron occidentale* Gray, July 21; one specimen, Mt. Rainier, Wash., mining leaves of the white Rhododendron, *Rhododendron albiflorum* Hook., August 15. The imagos appeared August 4-7 and August 28.

The early long very narrow linear mine (3-4.5 mm.) abruptly enlarges into an irregular blotch. The pupa is enclosed in a slight white cocoon.

This species is nearest to *L. latistrigella* Wlsm., also a *Rhododendron* miner; but differs strikingly from it in the absence of the conspicuous curved black streak from the middle of the dorsum.

NOTES AND QUERIES.

NOTES ON SOME MISCELLANEOUS ECONOMIC INSECTS FOUND IN NEW JERSEY.

Callopistria floridensis Guen. (Lep.). This insect, known as the Florida Fern-Cutworm, which has already been recorded by me as occurring in New Jersey (Canad. Ent., Jan. 1915), and doing considerable damage to ferns in greenhouses, was found to be effectively controlled by spraying with fresh pyrethrum, one ounce to one gallon of water, plus one half ounce of soap. One large fern grower in New Jersey applied the above spray once a week for five or six weeks and gained complete relief. Pyrethrum was also applied with a bellows, and similar results obtained. Mr. J. J. Davis, in the 27th Report of the State Entomologist of Illinois, advocates the use of this material, which is undoubtedly the best insecticide to use against this pest.

Phylomyza chrysanthemi Kowarz. (Dip.). In the 1909 list, "Insects of New Jersey," the Chrysanthemum Leaf Miner or Marguerite Fly, as it is also called, is recorded under the genus *Napomyza* from one locality. As a matter of fact, it is present every year in various greenhouses in northern New Jersey and does considerable damage to chrysanthemums. The larvæ mine the leaves, and the irregular whitish lines and blotches often take up an entire leaf surface. In addition to this disfigurement of the foliage, the size and number of flowers is often reduced. While nicotine solutions are effective against this insect (Sanders, J. G., A Remedy for Chrysanthemum Leaf Miner, Jour. Econ. Ent., vol. V, No. 6, p. 472), many greenhouse men persist in using the more or less unsatisfactory method of picking off and destroying infested leaves.

Oberea tripunctata Swederus. (Coleop.). Every year while inspecting nurseries it is customary to run across the work of the Dogwood twig-girdler. Smith, in "Insects of New Jersey," records it as occurring throughout the state. Its presence is detected by a withering of the leaves at the tip of the infested shoot. While it is undoubtedly widely distributed in New Jersey, it never, as a rule, occurs in sufficient numbers to do any considerable damage.

Hemichionaspis aspidistræ Sign (Homop.). In many fern houses in New Jersey this scale insect assumes the importance of a first-class pest. It is also being continually introduced into many houses on aspidistra imported from Belgium. As a rule, it is found on the lower leaves of the ferns, and by its spotting in bad infestations often makes the plants more or less unsalable. Unfortunately there is no satisfactory remedy, and the insects are usually got rid of by pulling off and destroying infested leaves during the operation of repotting or turning over the stock.

Isosoma orchidearum Westw. (Hymen.). Known as the Cattleya Fly, this member of the *Chalcididae* is an important pest in practically all orchid houses in New Jersey where *Cattleya* species are grown. The adult deposits one or more eggs in the bud, and development and pupation takes place inside, the bud finally becoming more or less swollen. In some cases I have found as many as six larvæ in a single bud. While fumigation with nicotine extracts to kill the adults is recommended as being the most efficient

method of control, I have never met an orchid grower who practised it. Most of them prefer to cut off and destroy the infested buds. If this operation is kept up persistently by an experienced man, it is only a question of time until the insect is eradicated. The man, however, must be experienced in detecting the infestations, otherwise many healthy buds will be destroyed. Many growers become quite expert in this, and can distinguish at a glance between a healthy and infested bud, both of which will seem perfectly normal to the ordinary observer. This insect also is undoubtedly being continually introduced in orchids imported from South American countries.

Aphrophora parallela Say. (Homop.). During June, 1915, many pine trees in a nursery at Elizabeth were observed to be rather plentifully infested by the above spittle insect, the white frothy masses giving the trees the appearance of having been decorated for Christmas. No injury to the trees could be detected, but it was somewhat unusual to find them occurring in such comparatively large numbers. It was noticed after collecting the nymphs that their bodies shrunk in five or six hours to one-third of their normal size.

Cecidomyia resinicola O. S. (Dip.). During June, 1915, many characteristic whitish masses of pitch inhabited by numerous orange-coloured larvæ of the fly were observed on the undersides of pitch-pine branches in nurseries at Springfield and Elizabeth. They attracted considerable attention from the nurserymen on account of their noticeable numbers, but no apparent damage was being done.

Corythuca arcuata Say. (Hemip.). Every summer this lace bug and its curious groups of eggs, which resemble certain forms of fungi, may be found on the leaves of oaks and other trees in various parts of the state. As a rule, it receives very little attention, although some seasons it is abundant enough to cause a whitening and withering of the foliage. Some day when it transfers its affection from forest to lawn trees, it may rank as more of a pest.

HARRY B. WEISS, New Brunswick, N. J.

ASPIDIOTUS ULMI JOHNS.

I have taken this insect on the following host plants in Missouri: *Catalpa catalpa*; *Ulmus* sp.; *Ptelea trifoliata* and *Juglans nigra*.

The scales were in abundance on all except the wafer-ash (*Ptelea trifoliata*), being thickly crowded between and under the rough bark. On the wafer-ash, however, I found only a few isolated scales, and these were located near the extremities of the twigs, the *Ptelea* being only a shrub a few feet tall. I have found no references to this scale attacking either *Ptelea* or *Juglans*, and so I offer these two as new host plants of *A. ulmi*. The scales winter over as nearly full-grown adults.

A. H. HOLLINGER,

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AN APPARENTLY NEW SPECIES OF PHALONIA.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

Among some material sent us for determination by the Bureau of Cereal and Forage Insect Investigation were specimens of a Phalonid bred by Mr. C. N. Ainslie at Elk Point, S. Dakota from *Spartinana michauxiana* in the stems of which the larvæ were boring, apparently along with those of *Tortrix clemensiana* Fern. since a specimen of this species was included under the same breeding number. As we can find no name applicable to this species, we describe it as new as follows:—

Phalonia spartinana, n. sp.

♂.—Head, thorax, and primaries pale ochreous, the latter shiny and immaculate with the exception of a minute dark dot at the end of the cell at the origin of vein 5 and another below the origin of vein 2; the costal margin at the basal half is dark brown; secondaries pale smoky, with whitish fringes. Beneath primaries deep smoky, with the exception of the pale costal margin and fringes; secondaries much as above. Expanse 20 mm.

♀.—Similar to the ♂ but larger and without the dark costal margin and dot below vein 2; secondaries without the smoky shade. Beneath the primaries are less smoky and more ochreous than in the ♂. Expanse 25 mm.

Types: 2 ♂'s, 1 ♀. Elk Point, S. Dakota (C. N. Ainslie). Coll. Barnes.

Related to *Phal. atomosana* Busck, but smaller, paler and lacking the sprinkling of brownish atoms characteristic of this species.

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POPULAR AND PRACTICAL ENTOMOLOGY.

FRESH WOODS AND PASTURES NEW.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

I.

Love of novelty never fades: it is the will-o'-the-wisp that lures us on in the morning of our years, and many a dance it leads us through the day. But long before noon we become aware of a steady glow from the opposite quarter: it is the glamour of the past and is destined to brighten our declining days in the evening of life. This charm of the old familiar things so grows on us that at last nothing grips the heart quite like meeting old friends; and among our friends surely not least are the flowers and their myriad winged visitors, so intimately associated with many a long summer's day ramble. So it comes about that a new locality, neither distant enough to be strange, nor near enough to be stale, beckons with both hands (as it were) by this double lure of new and old.

It was the beginning of May when I first set out to conquer the hinterland of my new home in Peterborough, armed to the teeth (almost) with Gray's botany and a cyanide jar. I had heard so often of the great Cavan swamp that I felt it must be subjugated first and a pretty heavy toll exacted of *flora* and *fauna*. One or two who took the trouble to answer me when I pestered them with questions, had told me that if I went far enough west on Smith Street I would certainly find the swamp. So out I marched, bag and baggage, and, sure enough, less than an hour brought me to a great stretch of wooded swamp on the north of the road: a fringe of willows and cedar, a broad belt of tall poplars, and, beyond that, tamarack, spruce, balsam—yes, and over yonder to the northeast, hemlock and a large hardwood of maple sights to make the botanist's heart beat. But alas! man, who murders to dissect, has drained the Cavan swamp in a vain effort to reclaim

the land; the natural growth of sphagnum has been killed and the floral wealth of Cavan is no more. All this I had yet to discover.

The day was bright, but a cold wind had encountered me on the road, that fought obstinately against my advance, hanging on my flank and stinging me with its slings and arrows. In the shelter of the swamp these missiles hurtled harmlessly over my head, while I roamed about through the hush of shadowed groves and across sunlit glades to the soft music of drumming partridges: they seemed to be everywhere in the heart of the swamp, and from time to time as I pressed forward I would flush one of the drummers from its retreat a few paces off. After about an hour of progress I found myself in a thick growth of cedars, and, working east a few rods, emerged at a great clearing just south of the G.T.R. between Peterborough and Best's. Between me and the railway was a wide sluggish stream of peaty-looking water—known (I believe) as a municipal ditch. The clearing extended east from where I stood for half a mile, with the drain on the north and a hardwood bush on the south; its greatest width was about 200 yards. It had been covered with small trees, mostly cedar, poplar, alder and elm; these had been nearly all cut down and much of the débris was lying on the ground. However, a fringe of alders still stood along the south bank of the stream, and the west end of the clearing had not been so heavily slashed.

While standing on the edge of this clearing I spied a large *Chrysomela* crawling up a burnt stump among the alders. It had the usual ebony pattern on its elytra; but instead of being creamy white, the ground colour was a rich chestnut. At the point of capture the insect dropped to the ground, but I was not to be denied, and a few minutes' search revealed my prize under a dead leaf. One swallow doesn't make a summer; it would be rash from a single beetle on a burnt stump to argue a new species of *Chrysomela* owing its brilliant complexion to a diet of charcoal. The neighbouring alders had not yet leafed out, but I searched their stems and branches carefully for over an hour and felt fully repaid by the result: four captures and one escape of the same chestnut-crimson *Chrysomela*; besides a dozen specimens of a beetle new to me so far except in cabinets *Lina lapponica (interrupta)*; both insects evidently hibernated freely.

Towards the end of May, when the foliage was all out, I tramped along the railway track to the east end of this place and spent most of the sunny hours of one Saturday roaming about the clearing. As I approached I could hear a man driving hardwood pickets into soggy ground in the heart of the swamp. The sound went on all day (just west of the clearing) at regular intervals. But in the clearing itself such abundance and variety of leaf-eating beetles—especially *Chrysomelus*—I have never met with. If *Chrysomela* means golden sheep, then this certainly was the enchanted land of Colchis, for golden fleeces hung on every tree; and if the word means golden apple, here was every branch laden with gleaming fruit, a veritable garden of the Hesperides.

Was the dragon that guarded the fruit asleep, or was it that indefatigable laborer hammering stakes into the ground behind the alder thicket? What good was a fence, anyway, in the heart of such a swamp? When the sound of that incessant hammer kept up till long after six o'clock, my curiosity got the better of me, and, stealing through the cedars and poplars at the west end of the clearing, I soon found myself on the edge of the municipal ditch and only a few yards from the mysterious workman; he stopped as soon as he saw me, and, without any warning, rose into the air and flapped heavily away over the trees—a common bittern; ten minutes later he was driving piles into the bank of Lily Lake half a mile away.

When I came to check over the day's bag of Chrysomelids—a work whose successful completion was due to Dr. Bethune's kind help—it was something like this. On willow in the clearing I had taken about a dozen of *Chrysomela multipunctata*—var. *bigsbiana*: this form, with a dark thorax margined before and on the sides with pale cream, and having the sutural stripe dark, I have never taken on any other plant than the willow. On dogwood—out of the scores seen—I had taken 8 of *Chrysomela philadelphica*: this form I have always found on dogwood, and I have never taken any other species of *Chrysomela* on that shrub; the whole thorax is dark-bronzed (from green to black) and the elytra are without the sutural stripe, though the scutellum is marked with a dark spot. On spiraea I took two or three of what I thought to be this same form, but they proved on examination to be the variety

spirææ, in which the dark sutural stripe is present. On alder, I had found the handsome chestnut-crimson *Chrysomela* abundant, and had taken some fifty specimens: they are apparently a very robust form of *Chrysomela philadelphica*, as they lack the dark sutural stripe, and their other markings correspond. (*Chrysomela philadelphica* var.—shall we say *alni* or *Hesperidum*?). While hunting for this insect on the fringe of alders beside the municipal ditch, I discovered yet another *Chrysomela* and succeeded in making about fifteen captures; it was almost as large as the last, but the ground colour was white to pale cream, with heavily-marked and united sutural and sub-sutural lines; in short, it was *Chrysomela scalaris*, with a very slight difference—the apical or third pair of spurs were broken away from the sutural line and appeared as two detached spots; and the middle pair of spurs also tended to be irregular and broken. The normal form of *scalaris*, I had found once in great abundance in the larval stage on basswood near the Rideau Ferry and in the six or eight beetles that I reared through the pupal state, I remarked the same variation in the ladder-like series of projections to which the species owes its name. Each of these forms was abundantly distinct from all the others; I never saw any sign of interbreeding; each colony, each species and variety appeared to keep to itself. On the alders in this swamp there were, besides, thousands of *Lina interrupta (lapponica)*; these were in all stages of *larvæ*, *pupæ* and *imagines*. In spite of its multitudes, and the short pupal interval between voracious grub and devouring beetle, the damage done to alder foliage seems trivial, due partly to the insect's small size and partly to the abundance of its food plant. Near the edge of the clearing I took two specimens of *Lina scripta*, feeding on willow; this beetle I have never found on any other plant than willow; those near Peterborough were all of the normal form, but often one or other of two varieties are to be found: in both of these the creamy ground-color of the elytra is replaced by a light-brown, and the elongated elytral spots are larger and only separated by narrow borders of the ground colour; in one variety these elongated spots are black; in the other, dark-brown; the former of these was sent me from Montreal, and I do not know its food plant; the other I found in abundance near Lindsay one season, feeding on willow. There

are four or five varietal forms illustrated by Blatchley (after Riley), but these do not include the forms I have just mentioned. Along the railway track, not far from this swamp, I took both species of *Crioceris* on plants of wild asparagus.

The genus *Chrysomela* has always been of great interest to me, I suppose because of its beauty, and, seeing in one of the books that the sub-species *rhoda* fed exclusively on hazel, I made a systematic search for the insect, but without any success. The only capture I have made on this plant is a species of *Balaninus* or nut-weevil, one of the wariest of insects; I have distinctly seen (and more than once) *Balaninus* swoon from the leaf it was resting on, while I was still several feet away; it invariably feeds in such a position as to drop into the tangled heart of the bush instead of falling exposed at the side. But the frequent occurrence of *Chrysomelæ scalaris* and *philadelphica* in varietal form on alder, coupled with their entire absence from hazel, rouses a suspicion. In size and habit, as well as character of foliage, the alder and the hazel are very similar, especially to a non-botanist: it would be interesting to get a consensus of opinion (or, rather, experience) in the matter from other field-collectors.

Another beetle, said by Blatchley to be beaten from hazel, is *Syneta ferruginea*. I had seldom seen this beetle (and never more than one at a time) till last season, but in testing out the alder as a food plant of *Chrysomelas* I took three or four pairs of *Syneta ferruginea* on leaves of alder near Bethany. The robust red-brown form of *Chr. philadelphica* I have now taken, two seasons running, and on alder, as far west of Peterborough as Mount Pleasant, and also two or three miles east of the city on the outskirts of my second hunting ground—Burnham's wood.

A NEW PHANURUS FROM THE UNITED STATES. WITH NOTES ON ALLIED SPECIES.

BY A. A. GIRAULT, GLENNDALE, MD.

1. *Phanurus opacus* Howard.

Both sexes are black; the thorax above is subglabrous.

2. *Phanurus floridanus* Ashmead.

The head and thorax are polished, the tibiae and knees pale

brown; segments 1 and 2 of abdomen have very short striae at base. The club is stouter than with *ovivorus*.

3. *Phanurus ovivorus* Ashmead.

The club is slenderer than in the preceding, the tibiae dark, the thorax above showing faint reticulation cephalad, but mostly glabrous. The first two segments of the abdomen do not have striae at base, or else these are extremely minute and short. In *flavipes* the vertex and scutum is uniformly finely reticulate. The species *ovivorus* is very close to *opacus*, if not identical.

4. *Phanurus emersoni*, new species.

Female—Length 0.90 mm. Black, the wings subhyaline, the venation pale dusky, the tarsi yellow. Differs from *opacus* Howard in that the male is varicoloured here. Differs from female *opacus*, *floridanus* and *ovivorus* in that the vertex and scutum are densely reticulated. Differs from *tabanivorus* in that the abdomen is only somewhat longer than the rest of the body, its third segment is not a fourth the length of the third, the thorax above is reticulated, and the male has the entire thorax honey yellow, also the antennae (besides the legs and head as in *tabanivorus*). Closest (female) to *ovivorus*, which it resembles. Stigmal vein nearly twice longer than the marginal, about half the length of the postmarginal. Funicle 1 a half longer than wide, two-thirds the length of the pedicel, 2 a little shorter than 1, 3 still shorter, 4 globular, smallest; 5 cup-shaped, 6 the same, larger, wider than long; 7 and 8 subquadrate, 9 ovate, longer than wide. Short, distinct striae at base of segment 2 of the abdomen.

In the male, funicles 1-3 are somewhat longer than in the female, while 4-9 are moniliform, wider than long, small; the club joint is ovate and as long as funicle 1 and stouter.

Described from a large number of both sexes reared from tabanid eggs at Dallas, Texas (F. C. Bishop).

Types—Catalogue No. 19664, U.S.N.M., 1 ♂, 8 ♀'s on two tags and a slide bearing 1 ♂, 4 ♀'s.

Types of *opacus*, *ovivorus*, *floridanus* and *flavipes* examined.

NEW GENERA AND SPECIES OF AUSTRALIAN
MUSCOIDEA.BY CHARLES H. T. TOWNSEND,
BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

The Muscoidea of all the principal regions of the earth have been catalogued, after a fashion, more or less completely, except those of Australia and Tasmania, which still stand without any published list whatever. The writer has recently prepared a complete synonymical catalogue of the Australian muscoid fauna, including that of Tasmania, in the course of which he has found it advisable to erect genera for certain described forms whose characters are sufficiently clearly recorded to allow of such action, credit being due to Brauer and Austen for elucidating the several types of Macquart and Walker concerned. These genera are presented in the present paper, together with descriptions of a few additional genera for new forms represented in the U. S. National Museum collection.

Paracalliphora, new genus.

Genotype, *Calliphora oceaniae* R. D., 1830, Myod., 438. Port Jackson and Timor (Brazil in error).

Differs from *Musca* (Calliphora) as follows: Epistoma more produced, not so constricted by the vibrissal angles. Ocellar bristles wanting in male, weak or vestigial in female. Cheeks and front both averaging narrower. Scutellum with only two strong marginal pairs of macrochaetae besides the apical pair. Abdomen scarcely broader than the thorax, much less thickly hairy. (Nine specimens: 4, Sydney, H. Gurney; 2, Reedy Creek, N.S.W., maggots from sheep; 3, Australia, Koebele, No. 483).

Calliphora tibialis (1st) Mcq., 1846, Dipt. Exot. Suppl. I, 195, Tasmania and Australia, belongs to this genus. Brauer (Sitz. Ak. Wiss. CVIII, 524) says: "Gehört mit *M. stygia* F. zu *Pollenia villosa* R. D." This would seem to be wrong, as specimens mentioned below in U. S. N. M. coll. agree fairly with Macquart's description and are congeneric with *oceaniae*. They bear a strong superficial resemblance to *villosa*, but lack the fulvous hair of abdomen. (Three spms.: Croydon, N. S. W., W. W. Froggatt).

Calliphora rufipes Mcq., 1843, Dipt. Exot. II (3), 286, Suppl. II, 99, Java and Tasmania, also appears to belong here, but I have no specimens and can only judge by comparing the description with material of *oceania*, to which it seems extremely close. Brauer (Sitz. Ak. Wiss. CVIII, 526) says that it equals *Musca stygia* F. (*villosa* R. D.), but this seems doubtful since Macquart says "caerulea * * * abdomen bleu." It is also rather too small (6 mm.).

Tricyclopsis, new genus.

Genotype, *Rhynchomyia dubia* Mcq., 1855, Dipt. Exot. Suppl. V, 129-30, Adelaide. Brauer, Sitz. Ak. Wiss. CVIII, 514.

Near *Triclea* Wulp, but the third vein is bare. Facialia ciliate to above middle of face. Facial carina absent. Arista long-plumose above and below. Parafacials with short bristly hairs. Third antennal joint three or four times as long as second. Palpi clubshaped. Epistoma strongly produced. Antennæ two-thirds as long as face.

Gerotachina, new genus.

Genotype, *Tachina obtusa* Walker, 1856, Dipt. Saund., 274-5, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 330-1 (Syn. *Echinomyia stolidus* Wlk., 1858, Trans. Ent. Soc. London; n. s. IV, 195-6, male).

Differs from *Microtropesa* Mcq. as follows: Third antennal joint of female distinctly shorter than the second; that of male not longer than the second, or but slightly longer; in both sexes the third joint is convex on upper border. Arista short and stout. Row of six to eight small admedian spinelike macrochaetae on hind margin of second abdominal segment. Agrees with *Microtropesa* in all other characters given by Walker and Austen.

Tasmaniomyia, new genus.

Genotype, *Masicera viridiventris* (1st) Mcq., 1847, Dipt. Exot. Suppl. II, 84-5, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 336-7. (Syn. *Masicera viridiventris* 2d Mcq., 1851, Dipt. Exot. Suppl. IV (2), 163-4, female, locality Egypt in error).

Differs from *Microtropesa* Mcq. as follows: Parafacials bare, only with some hairs above. Facial carina narrow, sunken, not easily visible from in front. No ocellar bristles. Male claws long and slender, female claws short. Vertex in female as wide as one eye, in male narrower. Several rows of bristles on parafrontals in both sexes, but orbitals apparently absent in female as well as male. Abdomen of female flattened and pointed, that of male more oval; male hypopygium small, not directed forward. Front prominent, face receding, epistoma not prominent. Third antennal joint over twice to three times as long as second. Hind cross-vein sinuate, at two-thirds distance between small cross-vein and cubitus.

Acephana, new genus.

Genotype, *Masicera rubrifrons* Mcq., 1847, Dipt. Exot. Suppl. II, 85, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339-40.

Differs from *Microtropesa* Mcq. as follows: Eyes hairy. Abdominal macrochaetae weak. Vibrissal angles somewhat convergent. Third antennal joint pointed on upper apical corner, like that of *Acemyia*. No ocellars. Female with two orbitals, and two verticals. Differs from *Goniophana* (equals *Tritaxys* Mcq.) in the hind tibiae not ciliate; and from *Gadiophana* in the short second arisal joint. Epistoma not very prominent. Arista thickened to middle. Hind cross-vein sinuate, at two-thirds distance between the small cross-vein and bend of fourth.

Opsophana, new genus.

Genotype, *Masicera rufifacies* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 340.

Differs from *Microtropesa* Mcq. as follows: No ocellar bristles. Eyes thickly hairy. Hind tibiae pectinate, with longer bristles below. Abdomen with only thin bristle-like macrochaetae. Male claws long. Epistoma much produced, the vibrissae situated high above oral margin. Related to *Goniophana* and *Acephana*. Front of male narrow. Frontals not descending below base of antennae. Third antennal joint about four times as long as the second. Apical cell ending near wing apex.

Chlorodexia, new genus.

Genotype, *Chlorodexia froggattii*, new species.

Differs from *Chlorotachina* Townsend (Proc. Biol. Soc. Washn. XXVIII, 21) as follows: Epistoma not nearly so produced, vibrissæ not farther above oral margin than length of second antennal joint. Cheeks wider in proportion to eye-height, ocellar and frontal bristles stronger. Pubescence of eyes longer. Cubitus well removed from hind margin of wing, with long and strong stump; hind cross-vein much nearer to cubitus. Abdominal macrochætæ longer and stronger, hairs of abdomen longer.

Chlorodexia froggattii, new species.

Length of body 11 mm.; of wing 11 mm. One male Merriwa, N. S. W. (W. W. Froggatt).

Metallic green, with a rather thick coat of silvery pollen over all. Facial plate and cheek grooves testaceous, the former with an ochre-gold pollen; frontalia dark brown, first two antennal joints dark rufous, third joint and arista brown, palpi dark brown. Parafrontals dull golden pollinose, extending to cheek grooves. Cheeks, occiput, thorax, scutellum and abdomen deep metallic green, more or less thickly pollinose, four heavy blackish vittæ on mesoscutum, abdomen showing more distinctly bright green, venter and pleuræ with less pollen. Legs dark brown, the femora blackish. Wings nearly clear. tegulæ tawny whitish.

Holotype—No. 19971 U. S. N. M.

Named in honour of Mr. W. W. Froggatt.

Protomiltogramma, new genus.

Genotype, *Protomiltogramma cincta*, new species.

Differs from *Miltogramma* as follows: Form more elongate, subcylindrical, the abdomen subconical. Vibrissæ strong, decussate, well differentiated from the peristomal bristles. Third antennal joint elongate, nearly three times as long as second. Cheeks of female about as wide as margin of epistoma, those of male much narrower. Scutellum enlarged, elongate and broad, especially so in female, with about five or six marginal pairs of macrochætæ besides the apical pair.

Protomiltogramma cincta, new species.

Length of body 7 to 10 mm.; of wing 5 to 6.5 mm. One male and one female, latter the larger; male from Hamilton, Upper North Pine, Queensland, Jany., 1890; female from Buderim Mt., Queensland, Dec., 1889 (Dept. of Mines and Agr.).

Face and cheeks luteous, with pale yellowish bloom; rather more silvery in male. Frontalia fulvous to fulvotestaceous, antennæ wholly light ochre-yellow, arista brown. Parafrontals golden. Thorax, pleuræ and scutellum with golden pollen, which is paler in front and on sides; the mesoscutum with three heavy brown vittæ plainly continued on scutellum. Abdomen dark brown or blackish, the second to fourth segments evenly bordered anteriorly with rather broad band of silvery, which may have a faint golden lustre. Legs black, femora pollinose on outside. Wings clear, tegulæ watery-white.

Holotype—No. 19972 U. S. N. M., female.

Froggattimyia, new genus.

Genotype, *Froggattimyia hirta*, new species.

Parafrontals and parafacials evenly covered with short black bristly hairs. Parafacials bulged, their planes not oblique but nearly transverse. Cheek grooves restricted. Cheeks of male swollen, one-half eye-height in width, evenly clothed with fine short black hairs; those of female with yellowish hairs. Female vertex a little less than width of one eye, that of male hardly over one-half eye-width. Female with two proclinate orbitals, male without. Ocellar bristles small. Front of male prominent; in profile, frontals descending only a little below base of antennæ face rather receding; facial plate elongate and narrow, only a little sunken, with rather sharp carina, vibrissæ situated well above oral margin, epistoma not prominent. Third antennal joint about two and one-half times second; palpi club-shaped. Apical pair of separated and strong scutellar bristles, and two lateral pairs. Abdominal macrochaetae vestigial in both sexes. Hind tibiae very short-ciliate in both sexes. Apical cell ending well before wing tip, open; hind cross-vein sinuate, nearer to bend; latter rounded, without wrinkle or stump. Parafrontals slightly widening below,

where they are nearly as wide as facial depression. Frontalia broad in both sexes, narrowed posteriorly in male.

Named in honour of Mr. W. W. Froggatt.

Froggattimyia hirta, new species.

Length of body 7 to 10 mm.; of wing 6.75 to 8 mm. One male and one female, Mittagong, N. S. W., reared from sawfly larvæ, Feby., 1902 (W. W. Froggatt). The smaller measurements are of the female, whose abdomen is flexed.

Cheeks, face and front pale golden; frontalia fulvous to rufous; antennæ fulvous, third joint brown on upper edge at least distally. Mesoscutum dark; with thin pollinose coat in male leaving five vittæ, the middle one linear; thick coat of ashy pollen in female, leaving four vittæ and a faint suggestion of fifth. Scutellum dull luteous. Abdomen brownish, broadly dull fulvorufous on sides from first to fourth segments in male, narrowly so on first to third segments in female, ashy pollinose on dark parts and yellowish pollinose on lighter parts. Legs luteous to fulvous, femora of male blackish on base. Wings nearly clear. Tegulæ pale yellowish to whitish.

Holotype—No. 19973 U. S. N. M., male.

Protomeigenia, new genus.

Genotype—*Protomeigenia aurea*, new species.

Differs from *Froggattimyia* as follows: Parafacials bare, with some short bristly hairs above near lowest frontals. Vertex of female fully as wide as one eye, that of male about two-thirds same. Frontalia rather wider, front more prominent, face more receding. Parafacials rather broader, not bulged, their planes oblique; facial plate distinctly more sunken. Scutellum with a weak decussate apical pair of bristles in both sexes, and three lateral pairs of stronger ones. Cheek grooves not so restricted. Cheeks not so swollen.

Protomeigenia aurea, new species.

Length of body 7 to 9 mm.; of wing 6.5 to 7.5 mm. One male and one female, Manilla, N. S. W., reared from sawfly larvae.

Jany. 10 and 13, 1902 (W. W. Froggatt). The female is the smaller and has the abdomen flexed.

Face, cheeks and front golden. Facial plate lighter, frontalia brownish-rufous. Antennæ bright rufous, the third joint blackish on upper edge and distally. Mesoscutum of both sexes with four vittæ, the inner pair linear. Scutellum fulvorufous. Abdomen of male with only the faintest suggestion of fulvous on sides, that of female without. Thorax and abdomen dark, quite thickly coated with silvery. Otherwise the colour description of preceding species applies exactly.

Holotype—No. 19974 U. S. N. M., male.

Austrophorocera, new genus.

Genotype, *Phorocera biserialis* Mcq., 1847, Dipt. Exot. Suppl. II, 89, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 347.

Allied to *Thrycolyga*. Facialia ciliate in two rows to base of antennæ. Apical scutellar bristles very fine, short, decussate. Male front rather broad, with two rows of bristles on each side. Frontals descending well below base of antennæ. Third antennal joint four times as long as the second, which is not elongate. Arista thickened on only basal half. Parafacials bare. Eyes hairy. No discal macrochaetae on intermediate segments of abdomen. Hind cross-vein sinuate, at two-thirds the distance between the small cross-vein and bend of fourth vein.

Pareupogona, new genus.

Genotype, *Masicera oblonga* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 338.

Runs to *Eupogona* in B.B.'s tables of Masiceratidae, and to *Gædia* in their tables of Phoroceratidae. Differs from *Eupogona* as follows: Male only. Second and third abdominal segments with discal macrochaetae. Legs elongate. Scutellum with strong separated pair of apical macrochaetae. Differs from *Gædia* in the open apical cell, which is very narrow at the end. Four postsuturals. Ocellars long, fine, proclinate. Facialia double-ciliate half way up. Parafacials with some short bristly hairs. Frontals strong, descending to middle of face. Vertex moderately wide. Eyes bare. Second

aristal joint short. Male claws long. Male with row of delicate bristles outside the frontals, together with short bristly hairs. Apical cross-vein straight, cubitus without stump. Vertical bristles strong. First abdominal segment with marginal macrochaetae. Costal spine small, third vein bristled only at base. Hind tibiae not ciliate. Proboscis short and stout, palpi club-shaped. Third antennal joint of male enlarged, about three times as long as the second.

To this genus apparently belongs *Masicera simplex* Mcq., 1847, Dipt. Exot. Suppl. II, 87, Tasmania; Brauer, Sitz. Ak. Wiss. CVI, 337. The characters agree well, except that the male vertex is considerably narrower.

Eurygastropsis, new genus.

Genotype, *Eurigaster tasmaniae* Walker, 1858, Trans. Ent. Soc. London, n. s. IV, 197, Tasmania, Austen, Ann. Mag. N. H. ser. 7, XIX, 331.

Allied to *Frontina*. Eyes and parafacials hairy. Ocellar bristles wanting. Epistoma very prominent. Macrochaetae of abdomen only marginal. Male claws short. Male frontalia narrowed posteriorly. Frontal bristles descending one-third way down the face. Facialia ciliate practically their whole length. Antennae reaching the epistoma, third joint six times as long as second. Arista thickened its whole length, hardly as long as third antennal joint. Cubitus obtuse, apical cross-vein slightly bent in, apical cell ending well before wing tip, hind cross-vein nearer to cubitus than to small cross-vein.

Mesembriomintho, new genus.

Genotype, *Mesembriomintho compressa*, new species.

Differs from *Mintho* as follows: Apical cell closed in margin, ending just before wing tip; cubitus close to hind margin of wing; costal spine atrophied. Front of male at vertex hardly over one-third width of one eye, that of female about one-half eye-width. Facialia bare. Arista plumose. Frontal bristles not descending below base of antennae. Abdomen strongly compressed laterally

in both sexes. No median macrochætæ on first abdominal segment. Front claws of male longer than others.

Mesembriominto compressa, new species.

Length of body 6.75 to 8.5 mm.; of wing 5.25 to 6.75 mm. One male and one female, Hamilton, Upper North Pine, Queensland, Jany. 1890 (Dept. of Mines and Agriculture). The female is the smaller.

Black, silvery pollinose. Frontalia and first two antennal joints dark brown; third joint dusky, with a silvery bloom. Palpi fulvous, obscurely infusate basally in female. Thorax silvery; with four linear vittæ, the middle ones stopping at suture; the outer ones obliterated anteriorly by a heavy broad vitta on each side, the two being confluent on anterior edge of thorax. Scutellum blackish. First abdominal segment, apical half of second and more than apical half of third shining black, not pollinose; rest of abdomen silvery-white pollinose. Legs blackish; femora brownish, silvery on outside, especially front pair. Wings lightly yellowish-smoky. Tegulæ watery-whitish.

Holotype—No. 19975 U. S. N. M., male.

Parabrachelia, new genus.

Genotype, *Masicera rufipes* Mcq., 1847, Dipt. Exot. Suppl. II, 86, Tasmania. Brauer, Sitz. Ak. Wiss. CVI, 339.

Differs from *Brachelia* as follows: Male only. Cheeks broad. Proboscis short, palpi slender. Apical cell closed in margin, cubitus without stump. Hind tibiæ not ciliate. Parafacials broad, bare. Ocellars present, proclinate. Male claws elongate. Abdominal macrochætæ discal and marginal. Apical cross-vein straight. Eyes thickly hairy. Epistoma prominently produced. Apical scutellar bristles erect, delicate, not decussate; the laterals very long and strong. Vertical bristles present. Second aristal joint short. First abdominal segment shortened, hypopygium small. Frontal bristles descending one-third way down the face. Third antennal joint three times the second, which is not elongate. Hind cross-vein only a little nearer to cubitus than to small cross-vein.

Austrophryno, new genus.

Genotype, *Tachina densa* Walker, 1856, Dipt. Saund., 288-9, New South Wales. Austen, Ann. Mag. N. H. ser. 7, XIX, 331 (Syn. *Tachina hebes* Wlk., l.c. 289, male, Tasmania).

Allied to *Phryno*. Facialia ciliate on lower one-third. Cheeks one-third eye-height. Antennæ inserted above eye-middle. Face broad. Frontal bristles descending to base of arista, with some small bristles below. Abdominal macrochaetæ only marginal. Epistoma only slightly prominent. Eyes hairy. Frontalia narrow. Antennæ about as long as face; the third joint slender in female and less than three times the second, in male about three times second. Arista much longer than third antennal joint, thickened at base. Cubitus hardly obtuse, apical cross-vein slightly bent in at base, hind cross-vein more or less bent inward.

Tracheomyia, new genus.

Genotype, *Oestrus macropi* Froggatt, 1913, Agric. Gazette N. S. W., July 2, 1913, pp. 567-8, pl. (5 figs.), Moramana Station, Walgett District, Australia. Maggot lives in the *windpipe* of the kangaroo. Fly unknown.

This appears to be an endemic Australian æstrid, and is the first one known. Its existence is thus of the greatest interest from the biogeographical point of view, as well as with relation to the phylogeny of muscoid stocks. The particular combination of larval characters is unique, as may be seen from the description and figures. The larval habitat in the host is likewise unique. The host itself is distinctively Australian. All these facts argue for the marked distinctness of the fly. The small boss of the anal stigmatic plates described by Froggatt would seem to be the false stigmatic opening or so-called button, and can hardly contain the spiracles which should lie outside the button in the field of the plates. It appears that the anal stigmata much resemble those of *Æstrus ovis*, but the armature is very distinct and approaches that of certain tachinids. Evidently this maggot does not belong to any of the described genera of Australian flies. It may be allied to *Pharyngomyia* or *Pharyngobolus*, judging from larval habit, but on larval characters it is nearer to *Æstrus* than to either of the genera named.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

The collection of Lepidoptera formed by the late E. Firmstone Heath, of Cartwright, Manitoba, was, shortly after his death, acquired by the Manitoba Government. Mr. J. B. Wallis, of Winnipeg, was asked to overhaul it and put it into condition for museum reference, as it was intended that it should form the nucleus of the entomological section of the Provincial Museum. Shortly before Christmas Mr. Wallis very kindly wrote offering me the opportunity of looking through it, a chance of which I was most ready to avail myself. Accordingly, in the last week of the old year, I visited him at his rooms on Boyd Avenue, where the collection had been temporarily deposited, and together we spent four or five days studying it, sorting out the mixtures, and making a full list of the species as far as we were able to identify them. Such species as we were uncertain about, or had no means of verifying, were subsequently sent east to experts in the various families. The *Hydræciæ* and *Papaipemas* went to Mr. Bird, *Geometrinæ* and *Hepialidæ* went to Mr. A. F. Winn, Drs. Barnes and McDunnough, the *Catocalas* and *Deltoids* to Mr. Arthur Gibson and Drs. Barnes and McDunnough, and the *Micros* to Mr. Busck. A number of species in all families were submitted to Messrs. Barnes and McDunnough. The assistance of all these gentlemen is most gratefully acknowledged.

Viewed as a whole, the collection was in poor condition. The percentage of worn or indifferent specimens was high, and, with a very few exceptions, the setting was badly done on short pins. Nearly all of those on long pins were from other collections. A portion, none too large a portion either, of the specimens bore date labels, usually face downwards; though so very low was the setting that the specimens had in any case to be removed whenever it was desired to read them. The authority for an identification was very rarely given, and even when given, was written on a label below a series, and never attached to the actual specimen or specimens named by a recognised authority. Some specimens

bore numbers, probably indicating that they or their duplicates had been submitted to an expert, and it may be possible in some cases to make guesses at associating these specimens with similar numbers amongst the numerous notes and correspondence pertaining to the collection, but which we did not then have time to look through. I cannot recall that we found one single instance in which a Cartwright label was attached to a specimen. But, as I believe Heath to have collected at Cartwright exclusively for about 35 years, we decided that it would be reasonable to assume any specimen to be of Cartwright origin unless any other locality or collector's name was pinned below it, as, for instance, I found was always the case with specimens which I had sent him myself. Heath, though a most energetic collector and ardent lover of nature, had, unfortunately, a poorly developed faculty for recognising a species. I had long previously discovered this from correspondence and exchange of specimens with him, though, as a matter of fact, he cared little for specimens not from Cartwright, and so rarely accepted in exchange. During Smith's lifetime, Heath had relied almost exclusively upon him for names in the Noctuidæ, and very rarely, either openly or privately, disputed a name that was given him. Now, Smith's determinations for corresponding collectors were very frequently, to say the least of it, hasty, and very often, alas, culpably careless. In my own experience, in my earlier collecting days in the west, I not infrequently found that if I sent Smith specimens of a species—it might be of a well known and not very variable species either—twice or three times, he would apply a different and very distinct name to it each time. Heath evidently met with this trouble, and got over the difficulty by dividing a species, not always very variable, into two or three. We frequently found a series of good or tolerably good specimens standing as one species, and a series of bad specimens of the same as distinct. And perhaps a series of smaller specimens of the same thing as something else, such as "probably new J.B.S." Nor was that all. Besides the frequency with which one species stood for two or more, it was deplorable the number of very distinct and often dissimilar species which were arranged in one series under the same name. In short, the errors and mixtures were appalling.

A few instances of the confusions and mixtures may be interesting. Heath had two female co-types of *Hadena miniota* Smith, described from Miniota and Cartwright. When I saw Smith's types at Rutgers's College, I recognised in them a form I have been taking at Calgary for twenty years simultaneously with, and apparently grading into, typical *versuta*, and thereafter in my notes in the "Canadian Entomologist" referred *miniota* as a colour-form of that species. (I have recently had good reason to doubt the correctness of that reference, but that is beside the point at present.) Heath wrote and remonstrated, saying that the two were entirely different and could not be confused. I assumed that he had misidentified *miniota*, and told him so. He thereupon showed me a co-type, which I returned with the remark that it merely confirmed my conviction. When I viewed the collection with Mr. Wallis, the mystery was solved. A short series of *miniota*, including two co-types, stood under *versuta*, which label had been surcharged upon a *miniota* label presumably, as per my dictum. But the surprise stood next to it. A long series, two columns or more, containing two or three *miniota*, and one or two other species, but principally *devastatrix*, stood also as *versuta*. That such a series should have been pronounced to be "quite distinct from *miniota*" was of course intelligible. But the complication did not end there, for in another box a series of *devastatrix* stood, pure, under its correct name.

Caradrina rufostriga stood in a series under its correct synonym of *punctivena*. Elsewhere in the collection it did duty as *Hadena indirecta*. *Noctua clandestina* stood correctly named, and also as *Amphipyra tragopoginis*. *Peridroma occulta* ditto, and as *Polia pulverulenta*. Four *Agroperina lutosa* and one *Scopelosoma sidus* stood as *lutosa*, and another series of *lutosa* as *Euxoa scandens*. One *scandens* stood as *Porosagrotis vetusta*. *Scandens* and *lutosa* were two species found scattered abroad throughout the collection. Another species badly mixed up with many others, particularly with *Orthosia dusca*, was *Parastichtis discivaria*, and one badly worn specimen of it stood as the sole representative of *Hadena semicana*. *Mamestra neoterica* was arranged in two series, one as *goodellii*, another as *acutermis*. *Acutermis* itself did duty for *neoterica*, and two specimens of it stood apart under "Noctua,

not identified by Smith''! *Mamestra grandis* did duty both for its own self, and for *legitima*. Four specimens stood under *Mamestra incurva*, two of them being *larissa* and two *vicina*. *Cleoceris curvifascia*, was *Hillia algens*, which also stood correctly. *Orthosia inops* and *Erastria panatela* stood together as *Tapinostola variana*, and *inops*, another rather widely scattered species, stood correctly named as well. One *Cucullia intermedia* stood as *Rancora albicinerea*, of which species two specimens stood together in the collection under no name.

I have mentioned only a few of the principal mixtures and misidentifications. I shall refer to others amongst the list of species to follow. These I think will serve to show that records published by Heath must be treated as wholly unreliable. They may also in some instances serve as a clue as to what species may have been intended by some of his published names. But, whilst that should be thoroughly borne in mind, the fact must not be lost sight of that the late Mr. Heath did a very great deal for western entomology, and his collection, which he spent so many years in accumulating, and which gave him so much pleasure in life, forms a very valuable basis on which Manitoba students may found a list of species occurring in that province. Would that such workers were more numerous.

The following list comprises only those species which are believed to have been taken by Heath at Cartwright. The order and nomenclature followed is, with certain necessary exceptions, that of Smith's 1903 Check List. In some instances amongst the Noctuidæ, where the generic names adopted by Sir George Hampson are at least fairly well known changes, I use those, adding the older ones in brackets. The time will probably not be long before a new general Check List will be published, in which the order and genera used by Hampson will be largely adopted.

RHOPALOCERA.

NYMPHALIDÆ.

Danaïs plexippus Linn.

Euptoieta claudia Cram.

Argynnis cybele Fabr.

Argynnis aphrodite Fabr. One female without label. Apparently typical, and agreeing with a female in the collection labeled Jefferson, N. Y.

Argynnis lais Edw. Very pale and near *cypris*.

Argynnis atlantis Edw. One male without label. Typical. I was surprised to see this form from Manitoba. Mr. Wallis has taken it quite commonly at Winnipeg Beach.

Argynnis nevadensis Edw. var. *meadii* Edw. Standing as *edwardsii*, by which form it used to be known in the west.

Argynnis myrina Cram.

Argynnis freija Thunb.

Argynnis bellona Fabr.

Phyciodes nycteis Db.-Hew. And two large females erroneously as *hanhami* Fletcher.

Phyciodes ismeria Bd.-Lec.

Phyciodes tharos Dru.

Grapta interrogationis Fabr. vars. *fabricii* Edw. and *umbrosa* Lint.

Grapta comma Harr. vars. *harrisii* Edw. and *dryas* Edw.

Grapta satyrus Edw.

Grapta faunus Edw.

Grapta progne Cram.

Grapta j-album Bd.-Lec.

Vanessa antiopa Linn.

Vanessa californica Bdv.

Vanessa milberti Godt.

Pyrameis atalanta Linn.

Pyrameis huntera Fabr.

Pyrameis cardui Linn.

Limenitis arthemis Dru.

Limenitis archippus Cram.

Debis portlandia Fabr.

Neonympha canthus Bd.-Lec.

Neonympha eurytis Fabr.

Cænonympha typhon Rott. var. *laidon* Borkh. Dr. McDunnough says that in his opinion this is *inornata* Edws., and that there is no justification in sinking *inornata* as a synonym.

Erebia discoidalis Kirby.

Satyrus alope Fabr. vars. *nephele* Kirby and *olympus* Edw.

Chionobas varuna Edw.

LYCÆNIDÆ.

Thecla acadica Edw.

Thecla calanus Hbn.

Thecla liparops Bd.-Lec.

Thecla augustus Kirby.

Thecla titus Fabr.

Thecla heathii Fletcher. There were no specimens under this name in the collection. The species was described in 1903 from a single female taken by Mr. Heath at Cartwright, about twenty-five years previously. As Dr. Skinner has suggested, it may prove to be an aberration.

Chrysophanus thoe Bdv.

Chrysophanus helloides Bdv.

Lycæna sæpiolus Bdv.

Lycæna afra Edw. The form stood as *couperii* Grt., but Mr. Wallis tells me that it is now called *afra* (teste, Dr. Skinner).

Lycæna rustica Edw. One female standing as *aquilo*. On comparison with Calgary material the specimen appears to be normal female *rustica*.

Lycæna melissa Edw.

Lycæna pseudargiolus Bd.-Lec. and vars. *lucia* Kirby and *neglecta* Edw.

Lycæna amyntula Bdv. Heath appeared to have separated two series as *amyntula* and *comyntas*, but the separation did not seem justified.

PAPILIONIDÆ.

Pieris protodice Bd.-Lec.

Pieris napi Linn. var. *oleracea-æstiva* Harr.

Pieris rapæ Linn.

Nathalis iole Bdv.

Colias cæsonia Stoll.

Colias eurytheme Bdv.

Colias eriphyle Edw.

Colias philodice Godt. According to specimens named for Mr. Wallis by Dr. Skinner, *eriphyle* and *philodice* fly in Manitoba, and are distinguishable, and both are in the Heath collection. He calls those with secondaries yellow beneath *eriphyle*, and those green *philodice*. The green appearance, by the way, is really the effect of an admixture of black scales upon a pale lemon ground. If that diagnosis is right, then I have two species mixed at Calgary, but must admit my inability to draw a line between them. Moreover, all my *philodice* from the eastern states have most distinctly yellow undersides to the secondaries.

Papilio polyxenes Fabr.

Papilio glaucus Linn. var. *turnus* Linn.

HESPERIIDÆ.

Carterocephalus palæmon Pall.

Thymelicus garita Reak.

Pamphila hobomok Harr.

Pamphila comma Linn var. *manitoba* Scudder. Females only stood under the name, but males of this form stood under *mystic*.

Pamphila peckius Kirby.

Pamphila mystic Scudd. Three females, much worn.

Pamphila cernes Bd.-Lec.

Pamphila metacomet Harr.

Amblyscirtes vialis Edw.

Pyrgus tessellata Scudd. Probably the form named *occidentalis* by Skinner in Ent. News, XVII, 96, March, 1906, and figured on plate XIII, October, of the same year.

Nisoniades brizo Bd.-Lec.

Nisoniades icelus Lint.

Nisoniades juvenalis Fabr.

Eudamus pylades Scudd.

Eudamus tityrus Fabr.

(TO BE CONTINUED)

A FEW OBSERVATIONS ON THE APPLE MAGGOT
PARASITE—*BIOSTERES RHAGOLETIS*,
RICHMOND.

BY C. A. GOOD, TRURO, NOVA SCOTIA.

In the September number (1915) of the Canadian Entomologist appeared an article written by Mr. W. C. Woods of Orono, Maine, in which he discussed the presence of the new apple maggot parasite, *Biosteres rhagoletis*. As he had not seen the insect at work, the following short account should be interesting since it throws some light upon the manner in which the maggots are parasitized.

In August of this year, while observing the oviposition habits of the apple maggot near Digby, Nova Scotia, my attention was drawn to several small, brownish insects which were flying about the leaves. Presently one of them alighted upon an apple, and after slowly crawling over it in an erratic fashion for a few minutes, it raised itself high on its legs and began prodding the skin of the apple with its ovipositor. Previously this instrument had been stretched out behind the abdomen in a horizontal position, but it was now bent under it, and down in a vertical manner. First using the two heavier and outer pairs of the ovipositor to pierce the skin, they were eventually raised up slightly while the lighter-coloured, more slender egg-tube was plunged into the apple to a depth of about one-quarter of an inch. After a pause of a few seconds the whole was withdrawn and the insect moved to a new spot, recommencing the operation at once. Five punctures were made in rapid succession before I caught it. This insect was later determined by Mr. E. A. Richmond, of Cornell University, as *Biosteres rhagoletis*.

Thus it appears that this parasite is a larval one, and this, no doubt, accounts for the high percentage of mortality among the larvæ and pupæ of the apple maggot.

May, 1916

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN AND
THE DESCRIPTION OF A NEW SPECIES
FROM AFRICA.

BY FRED V. THEOBALD, M.A.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN.

No less than eight species of Plant Lice or Aphididæ have been found at different times on the apple in Great Britain. The following are the species I have examined:—

1. *Aphis pomi* De Geer.
2. *Aphis kochii* Schonteden.
3. *Aphis cratægi* Kaltenbach.
4. *Aphis nigra* nov. nom (*oxyacanthæ* Koch).
5. *Aphis rumicis* Fabricius.
6. *Siphocoryne avenæ* Fabricius.
7. *Phorodon humuli* Schrank.
8. *Eriosoma lanigera* Haussman.

Of these, four species are common, namely, *Aphis pomi*, *Aphis kochii*, *Siphocoryne avenæ* and *Eriosoma lanigera*.

Of the others, I have several times received or found Kaltenbach's *Aphis cratægi*, which must not be confounded with the *Aphis* of that name redescribed by Buckton in his Monograph of British Aphides,* which is a totally distinct insect—green, not black! *Aphis rumicis* was sent me once from apples in 1900, and in 1904 I found many on some "Maiden" apples, undoubtedly "casuals" in both cases. Nevertheless this Aphid was reproducing on the fruit trees.

Aphis oxyacanthæ Koch (non Schrank) has been sent me once from Berkshire.†

Phorodon humuli, the Hop-Damson Aphid, was found in 1911 breeding on a few apple trees at Wye in considerable numbers. The chief object of this paper is to show that the most harmful of all apple-leaf and shoot-feeding "Plant Lice" in Great Britain is Koch's *Aphis pyri*, renamed by Schonteden *Aphis kochii* (for reasons afterwards given), and not as has been stated here and in America, Kaltenbach's *Aphis sorbi*, which was described from specimens found on *Sorbus aucuparia*, a totally distinct species.

*Vol. 11, p. 35, pl. XLVII, figs. 1-3, 1877.

†This I have renamed *Aphis nigra*.

It was only through receiving some apteræ from that tree sent by Mr. Britten, from Cumberland, that I discovered this general mistake.

That the so-called Brown, Blue and Rosy Aphis or Leaf-curling Aphis of the apple in England was not *Aphis sorbi* was at once seen, for Kaltenbach* clearly stated that the cornicles of the apterous ♀ were "*blassgelb, an der Spitze bräunlich*," whilst the erroneously called *Aphis sorbi* has them markedly *black* in all stages.

Probably the presence of the four pre-anal papillæ in both species led Sanderson and others to the conclusion that they were the same. Very similar papillæ, I find, also occur in Kaltenbach's *Aphis cratægi*.

I have not attempted to deal with all the known features of the life histories of these insects, nor the full bibliography, but merely point out their proper names and the salient features of their bionomics as observed in Britain and the literature examined.

The Woolly Aphis (*Eriosoma lanigera*) is not dealt with, however, as I am preparing a special report on this insect in regard to its life in Britain. Several other species have been found on the apple in America; only one of these, so far, is known in Europe, namely, Koch's *Aphis medicaginis*, which I have found in England, but which, up to now, has not been noticed on the apple. These are referred to in a note at the end of this paper. I also add the description of an undescribed Apple Aphis from Africa.

SYNONYMIC LIST OF BRITISH APHIDIDÆ FOUND ON THE APPLE.

1. *Aphis pomi* De Geer.

Aphis mali Fabricius.

Aphis pyri Kittel (non Boyer, Koch).

Aphis padi Sanderson (non Linnaeus).

Aphis oxyacanthæ Schrank.

2. *Aphis kochii* Schonteden.

Aphis pyri Koch (non Boyer).

Aphis pyri-mali Fabricius (part).

Aphis mali Buckton (part), Britton.

*Mono. Pflanzenlause, 1, p. 70, 1843.

Aphis sorbi Walker (part), Sanderson, Theobald, etc., (non Kaltenbach).

Myzus mali Ferrari (part).

**Aphis malifoliae* Fitch.

3. ***Aphis crataegi*** Kaltenbach (non Buckton).

4. ***Aphis nigra***, nov. nom.

Aphis oxyacanthæ Koch (non Schrank).

5. ***Aphis rumicis*** Linnæus.

Aphis papaveris Fabricius.

Aphis thlaspeos Schrank.

Aphis fabæ Scopoli.

Aphis atriplicis Fabricius.

Aphis aparines Schrank.

Aphis armata Haussman.

Aphis dahliæ Mosley.

Aphis atriplicis Buckton.

Aphis evonymi Fabricius.

Aphis ulicis Fabricius.

Rumicifex Amyot.

Meconaphis Amyot.

6. ***Siphocoryne avenæ*** Fabricius.

Aphis avenæ Fabricius.

Aphis avenæ sativæ Schrank.

Aphis annuæ Oestlund.

Aphis mali Fitch (non Fabricius).

Aphis fitchii Sanderson.

Aphis crataegifoliae Fitch.†

7. ***Phorodon humuli*** Schrank-Koch.

Aphis humuli Schrank.

Aphis pruni Scopoli.

*Schonteden places this as a synonym of De Geer's *Aphis pomi*. It is certainly not so.

†Schonteden gives Fitch's *Aphis prunifoliae* as a synonym. It is not, for this is clearly only *Aphis pruni*.

8. *Eriosoma lanigera* Haussman.*Aphis lanigera* Haussman.*Eriosoma mali* Somonelle.*Myzoxylus mali* Blot.*Schizoneura lanigera* Kaltenbach.*Pemphigus pyri* Fitch.

TABLE OF SPECIES:

Alate viviparous females

I. Cornicles present.

A. Abdomen green, with black lateral spots, etc.

B. Head and base of antennæ without marked processes. Cornicles long, cylindrical, black. Antennæ with 7-8 sensoria on segment 3 and 2 to 4 on segment 4.....*pomi* 1
Cornicles moderately long, black, slightly swollen at base.Antennæ with 5-6 sensoria on 3 in a line, none on 4.....*pomonella* 2

Cornicles rather short, pale brown to green, constricted at base and apex.

Sensoria on segments 3, 4 and 5.....*avenæ* 3BB. Head and base of antennæ with marked processes.....*humuli* 4AA. Abdomen dark. Black, brownish-black, deep olive-green, with 5 blacker lateral spots and bars, rather shiny.....*rumicis* 5Unknown.....*nigra* 6AAA. Abdomen reddish and black.....*kochii* 7AAAA. Abdomen black white at base.....*cratægi* 8II. No cornicles.....*lanigera* 9*Apterous viviparous females.*

I. Cornicles present.

A. Green, not mealy.

B. Cornicles long, cylindrical, black.....*pomi* 1BB. Cornicles shortish, brown and green, constricted at base and apex.....*avenæ* 2BBB. Cornicles long, thin, green.....*humuli* 3

- AA. Blue-black, slaty or pink, cornicles black, globose and mealy.....*kochii* 4
- AAA. Black.
- B. Somewhat flattened; mealy.....*cratægi* 5
- BB. Globose; somewhat mealy; often with white flecks.....*rumicis* 6
- BBB. Globose; not mealy; all legs black.....*nigra* 7
- II. No cornicles.....*lanigera* 8

Aphis pomi, De Geer.

Aphis mali Fabricius (non Oestlund, etc.).

Aphis oxyacanthæ Schrank (non Koch).

Aphis padi Sanderson (non Linnæus).

Aphis pyri Kittel (non Boyer, Koch, etc.).

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Note.—Oestlund says Dr. Fitch's *Aphis malifoliae* appears to be a variety of *Aphis mali* Fabricius, Schonteden, etc., and thinks it is the same as *Aphis pomi* De Geer; that is *mali* of Fabricius. I think it may be *kochii*; it is certainly not *pomi*.

DESCRIPTION:

Alate viviparous female.

Head and thorax black. Abdomen green; cornicles straight, black, imbricated. Antennæ shorter than body; 3rd segment with 6-10 sensoria; 4th with 2-4 sensoria; 3rd longer than 4th, 4th longer than 5th, 3rd to 6th imbricated. Cauda black, blunt, with 4 to 5 pairs of lateral hairs. On the green abdomen are four pairs of lateral black spots, and from each arises a blunt projecting tubercle, and another is present on the segment carrying the cornicles, smaller than the preceding but marked; the 7th and 8th segments may have blackish median basal patches. Legs green; apices of femora and tibiæ dark; tarsi dark. Wings with yellowish-green insertions. *Length* 2.0 to 2.5 mm.

Apterous viviparous female:

Bright green to rich yellow green; cornicles markedly black, slightly tapering, thick and rather long. Cauda blackish to deep brown. Antennæ not quite as long as the body; 3rd to 6th segments imbricated; 3rd longer than 4th, 4th very slightly longer

than the 5th. Legs green; apices of femora and tibiae and the tarsi black.

Length 1.5 to 2 mm.

Oviparous female:

Apterous. Green to dull yellow, often mottled; head brownish. Cornicles black, straight, imbricated. Cauda black. Antennae not as long as body, of 6 segments, basal one larger than the 2nd, 3rd, 4th and 5th nearly equal in length; 6th about as long as 4th and 5th; the 5th and 6th dark; also the 1st and 2nd, remainder green; imbricated, especially apically. The junction of the 3rd and 4th often indistinct. Eyes large, dark. Proboscis reaching past the 2nd pair of legs, acuminate. Pronotum with a large green papilla on each side; abdomen with a large papilla on each side before hind legs and 3 smaller ones between them and the cornicles; sometimes yellowish laterally; also with a few hairs. Cornicles thick, black, cylindrical, slightly expanding basally, imbricated, longer than segment 3 of the antennae. Cauda prominent, dark and very spinose, with 5-6 pairs of lateral hairs curved apically and a median dorsal apical one. Anal plate dark. Legs with dark femora, except just at their base; tibiae pale, dark at the apex; tarsi dark; hind tibiae with a few pores (2-6), or trace of sensoria*; genitalia dark.

Length 1 to 1.5 mm.

Male:

Apterous, dull yellowish-brown, yellowish-green to green. Antennae of 6 segments, not quite as long to slightly longer than the body; 1st segment wider than the 2nd, but no longer; 3rd as long as the 4th; 4th slightly longer or the same length as the 5th; 6th about as long as the 4th and 5th; in a few I have noticed a single sensorium on the 4th; edges markedly serrated. Eyes large, black. Cornicles black, cylindrical, slightly expanding at the base; not quite as long as segment 3 of the antennae. Femora and tibiae dull green to deep brown, except the apex of the latter; tarsi dark. Cauda black, spinose, with several long lateral hairs bent at their tips. Genitalia black. Penis yellowish.

Length .8 to 1.0 mm.

*Gillett says 10 oval sensoria on hind tibiae.

Food Plants—Apple, Pear, *Cotoneaster vulgaris*, *Cydonia* spp., *Mespilus germanicus*, *Cratægus oxycanthæ*, *C. monogyna*. It has also been referred to on *Sorbus aucuparia*, *S. domesticus*, and *S. torminalis*. Macchiati gives *Mespilus japonica* and *Ailantus glandulosa* (p. 255).

Distribution.—All over Britain and Europe generally, America, South Africa. The only African records are Dewar's (1905) and are by Lounsbury, who found the ova on imported stock. Tasmania (Lea).

NOTES ON LIFE-HISTORY.

The Green Apple Aphis occurs every year on apples and pears in Britain, often in considerable numbers, but never in such vast swarms as does the following species. Moreover the damage caused by it is not nearly so severe as that done by *Aphis kochii*. It mainly lives on the top shoots and beneath the leaves; sometimes it is densely packed together; at others in scattered groups. The curling of the foliage is not nearly so severe as in attacks of *Aphis kochii*. This green "Dolphin" hatches out from mid-April to early in May; that is somewhat later than in the following species. It increases very slowly at first, but in June it may spread very rapidly, and on into July, when the tops of the trees may become covered with it. The earliest alate females I have found were towards the end of June, and these may continue to appear erratically on into August and fly from the apple and pear to other trees close by. In October the sexual forms occur, namely, apterous, oviparous females and apterous males. These often swarm in October and November under the leaves, where copulation takes place. When fertilized, the females crowd on to the shoots and there deposit their ova, usually great numbers together, so that nothing of the shoots can be seen. At first the ova are yellowish-green to dull yellow; in a few days they become black and shiny. There they remain all the winter. The males are very few in number. The whole life-cycle seems to be passed on the apple and pear, unlike *Aphis kochii* and *A. avenæ*.

Miss Patch also finds in America that it is not migratory, and is thus to be found at all seasons of the year upon apples in some form or other.

This species does comparatively little harm in Britain, although

it often occurs in great abundance. On young nursery stock, however, I have seen it not only stunt the growth to a very great extent, but to actually kill the tender tips of the shoots. In America Miss Patch says that it is by far the most troublesome of the leaf aphides of the apple in Maine; contrary to what we notice in Britain. It can easily be dealt with by spraying, unlike our most troublesome Apple Aphis—*Aphis kochii*.

The hind tibiae of the oviparous female are not swollen, as is usual, and bear but very few sensoria; in fact, in many I have been unable to find any pores at all.

(TO BE CONTINUED).

SOME 1915 NOTES ON A FEW COMMON JASSOIDEA IN THE CENTRAL MISSISSIPPI VALLEY STATES.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY,
WASHINGTON, D. C.

The past year has been especially favourable for jassid collecting in the Central Mississippi Valley, principally because of frequent rains favouring rank growth of native grasses and weeds, and an ever abundant supply of tender plant growth and foliage. The following notes are from observations made in western Illinois, Kentucky, Tennessee, eastern Missouri and Arkansas.

Draculacephala mollipes Say was everywhere abundant from early spring until late fall. During the early summer it was very numerous in northern Arkansas, where it caused considerable injury to young corn. Great quantities were observed around electric lights in the heart of the city of St. Louis early in September. There is no doubt but that *D. mollipes* has a characteristic habit of long flights at night. This is one, if not the most general feeder of all the Jassoidea. However, oviposition seems to be confined principally to grains, grasses, and grass-like plants. This sharp-headed grain leafhopper was seldom taken in sweepings from the foliage of trees.

Diedrocephala versuta Say became abundant during the late summer. It was found to be of economic importance to cow-peas in Missouri, where occasional injury was noted to the tender growth of the vines. Alfalfa is the only other field crop upon which they were found abundant. Adults were collected from many ornamental

plants and shrubs growing in the Missouri Botanical Gardens at St. Louis. This species, the nymphs particularly, seem to be rather sluggish in their movements. They do not jump or run quickly, and it is quite easy to put one's finger on them.

Diedrocephala coccinea Say, one of the most handsome and striking forms, was taken wherever collections were made. While not found in such numbers as *D. mollipes* or *D. versuta*, yet they were observed feeding on a great variety of plants, including over 50 species of weeds, on many ornamental plants and shrubs, and various trees. It was the only species found to feed on the leaves of the American Holly. Many of their nymphal cast skins were observed on the under side of the leaves of Magnolia trees, upon which they undoubtedly feed. Adults are attracted to lights at night and remain almost inactive during the day time.

Phlepsius irroratus Say appeared to be of considerable economic importance to alfalfa and clover throughout the central Mississippi Valley states. It was also collected in abundance from various grains during the spring months. The greatest damage done seems to be caused by the feeding of the nymphs and adults upon the stems, which they prefer to the leaves. This irrorate leafhopper exhibits flight as much in day time as at night. Adults and nymphs were captured at all seasons of the year.

Agallia sanguinolenta Prov., the clover leafhopper, has a general distribution, and occurred in sufficient numbers to cause some alarm to alfalfa growers. This with *Empoasca mali* caused considerable injury to alfalfa and red clover in southeast Missouri during the early summer months. It proved, however, to be easily captured in the hopperdozer. This is one of the hardiest of the Jassoidea. Adults were observed to be active in grain fields during the winter months on comparatively cold days, when other species were in hiding or hibernating. The list of food plants is quite limited, it having been taken from but few other plants than those of the Leguminosæ family.

Empoasca mali Le. B. was probably the most injurious jassid of the year, adults and nymphs attacking alfalfa, clover, and several other field crops in great numbers. The species occurs everywhere in the Mississippi Valley, and is most injurious in the central states. It easily adapts itself to change of food plants, as

is evidenced by the innumerable plants, shrubs, and trees upon which it is known to feed. This is one of the earliest species to make its appearance in the spring. During 1915 there were at least six generations for the latitude of southern Illinois. The author has for some time suspected this species of being an important factor in the spread and dissemination of the alfalfa yellow leaf spot, *Pseudopeziza medicaginis*, and the brown spot, *Coletotrichum trifolium*; and in this regard possibly *Agallia sanguinolenta* plays a part. The adults exhibit a strong habit of flight, especially at night.

Among other Jassoidea which were common during the year, the following may be listed:

Pediopsis viridis Fitch.

Agallia constricta Say.

Cicadula 6-notata Fall.

Deltocephalus inimicus Say.

Deltocephalus nigrofrons Forbes.

Athysanus exitiosus Uhl.

Athysanus bicolor Van D.

Platymetopius frontalis Van D.

Eutettix seminuda Say.

Typhlocyba comes Say.

ENTOMOLOGICAL NOTES.

Alfred E. Cameron, D.Sc., M.A. (Aberdeen), M.Sc. (Manchester), has been appointed a Field Officer of the Entomological Branch, Ottawa. He will be specially charged with the investigation of the Pear Thrips and other insects in British Columbia.

Dr. Cameron graduated in 1909 in the University of Aberdeen with the degree of master of arts. After taking the further degree of bachelor of science in Zoology, he took up advanced entomological work under Prof. Maxwell Lefroy, Professor of Entomology in the Imperial College of Science, London, and continued his entomological research work as an Honorary Research Fellow in the University of Manchester in 1912, where he took the degree of master of science (M.Sc.). He was appointed by the English Board of Agriculture and Fisheries to a Government Scholarship, and continued his investigations in England and in the United States. In 1914 he spent a year conducting practical entomological

work and spraying experiments in the Agricultural Experiment Station of New Jersey under Dr. Headlee, State Entomologist, and returned to England to take up university work in Manchester and the University College of South Wales. He has published a number of entomological memoirs in various scientific journals and received his doctorate in 1915. His thorough scientific and practical training will make him a valuable addition to the Entomological Branch of the Dominion Department of Agriculture.

* * * *

THOMAS H. CUNNINGHAM.

We regret to announce the death, on February 16th, of Mr. Thomas H. Cunningham, Inspector of Fruit Pests for British Columbia, at the age of 78 years. Mr. Cunningham's health had been poor during the last two years, but he continued his duties in spite of advanced years and diminished vigour with a characteristic tenacity.

For many years he had served the Board of Horticulture of British Columbia as its Inspector of Fruit Pests with a zeal rarely equalled. It was natural that in the prosecution of his work of inspecting orchards and nurseries, imported nursery stock and fruit, he should fail to please everybody; but to the wholehearted enthusiasm with which he carried out his work is due, to no small degree, the comparative freedom of British Columbia orchards from some of our most serious fruit pests. To name two in particular, the Codling Moth and San José Scale, would have been widely distributed by this time but for the energetic methods he employed. The fruit growers of the province owe much to his industry, and his death removes a unique member of the Entomological fraternity of Canada.

* * * *

The Ohio State University has recently inaugurated a plan providing for Research Professors which enables the holders to devote their time especially to research work, and Professor Herbert Osborn has been elected Research Professor in the Department of Zoology and Entomology. He will be relieved from routine, class and department duties, devoting his time to researches, especially in the line of Entomology, but will continue to have direction of research work of Graduate students in his particular field.

Mailed May 15th, 1916.



LEPERISINUS CALIFORNICUS, N. SP.

Adult (enlarged 10 diam.); and tunnels in olive branch (natural size).

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No. 6

NEW SPECIES OF THE FAMILY IPIDÆ (COLEOPTERA)*

PART III.

BY J. M. SWAINE,

ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Pityokteines jasperi, n. sp.

A small, very slender species, closely allied to *sparsus* Lec; with the elytra very closely, regularly, deeply punctured behind.

Description of the female—Length, 2.3 mm.; width, .7 mm.; colour, dark piceous, nearly black, with the antennæ and legs paler. The *head* has the front plano-convex, densely very finely granulate, with a small median tubercle, and thickly clothed with very long curved yellow hairs much as in *sparsus*; the antennal club thickened basally, very obliquely truncate and depressed apically, with the sutures confined to the apical depressed outer surface.

The *pronotum* is distinctly longer than wide, with the sides straight on the basal half, broadly evenly rounded in front; coarsely, rather densely, and irregularly asperate in front; rather coarsely, moderately closely and deeply punctured behind, more finely near the rather wide smooth median line; with sparse long hairs about the sides and in front, and the front margin densely fringed with long curved yellow hairs.

The *elytra* are elongate, with the sides parallel beyond the middle, the striae narrowly faintly impressed, the sutural striae distinctly deeper and wider, the striae punctures of median size, very close on the disc, and deep; the interstriae punctures regularly uniseriate, deep, as large as those of the striae and nearly as close on the caudal half, as close and granulate near the declivity, a little smaller and less numerous towards the base. The declivity is steep, convex, with the suture elevated and granulate and the

*Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

sutural striæ strongly impressed; almost unarmed, with the declivital teeth reduced to three extremely minute acute granules in the usual situations, on the 2nd and 3rd and 6th interspaces, with a very few additional minute granules; the declivity very closely and deeply punctured. The pubescence of the elytra is rather short and abundant on the sides and behind.

The *male* has the front plano-convex, densely, deeply granulate-punctate, with an indistinct median carina, and sparsely hairy; the declivity concave from the deeply widely impressed sutural striæ, sparsely deeply punctured, shining, the 2nd and 3rd teeth large, acute, within the rather distinct granulate lateral margin, the 2nd curved, the first tooth minute. Jasper Park, Alberta, Canada. The type is in the collection of the Entomological Branch, Ottawa.

***Pityokteines elegans*, n. sp.**

This species is closely allied to *sparsus* (*balsameus*) Lec., but is slightly more elongate, with the elytral striæ finely, regularly impressed, and the interstitial punctures very small.

Description of the female—Length, 2.5 mm.; the head has the front flattened, densely, finely granulate, very densely clothed with very long incurved orange-coloured hairs; the antennal club wider than long, the first suture nearly straight except at the sides, the distal oblique part strongly depressed.

The *pronotum* is slightly longer than wide, with the sides feebly arcuate on the basal half; the front margin broadly rounded, rather closely asperate in front; rather finely and sparsely punctured behind, with a wide smooth median space; the hairs sparse, long and erect about the sides, thicker on the frontal declivity and gradually longer from the summit to the apical margin, which is densely fringed with very long orange hairs similar to those of the front of the head.

The *elytra* are slightly longer than in *sparsus*, with the sides parallel, the apex semicircularly rounded, the striæ finely regularly impressed, the sutural striæ somewhat deeper and wider than the others; the stria punctures small and very closely placed, slightly smaller at the base; the interspaces wide, moderately convex on the disc, smooth except near the declivity; the interstitial punctures

sparse on the disc and distinctly smaller than those of the striae, becoming closer, as large as those of the striae and granulate near the declivity and on the sides; the declivity very steep, almost as in *sparsus*, shining, sparsely but strongly punctured; the suture raised, the declivital face somewhat circularly flattened and rather deeply and broadly sulcate on each side, with three small, acute teeth on each side, situate just within the rather ill-defined, crenulate, lateral margin of the declivity, the ventral acute margin formed by two crenulations on each side and absent near the suture.

The *male* has the front convex, rather coarsely punctured, more sparsely behind, rather densely towards the epistoma, the punctures slightly granulate, sparsely hairy; the pronotum without the fringe of long hairs from the front margin; the elytral declivity deeply concave, with the 2nd and 3rd teeth of each side forming part of the lateral margin and very large, stout, incurved and acute.

Described from four females and two males, sent by Professor H. F. Wilson, Corvallis, Oregon, Labels: Hood River, O.; Childs Coll.; 8-20-14; Also, Grassy Lake, Lassen Co., Cal., *Pinus monticola*, Mr. Ralph Hopping. The type is in the collection of the Entomological Branch, Ottawa.

***Orthotomicus lasiocarpi*, n. sp.**

A very small slender species combining characters of *Orthotomicus* and *Pityokteines*.

Description of the female—The length, 2 mm.; slender. The *head* has the front convex, deeply rather coarsely punctured, sparsely towards the vertex, densely towards the epistoma; with a wide median carina on the caudal two-thirds; transversely impressed on the epistoma; the pubescence short and inconspicuous, closer on the epistoma; the antennal club slightly longer than wide, obliquely truncate on the distal half, with the distal segments showing from the upper side at the apex, the sutures procurved, the sutures of the under face on the distal half and slightly procurved.

The *pronotum* is slightly longer than wide, feebly arcuate on the sides behind, slightly constricted before the middle and broadly

rounded on the front margin; the asperities of the cephalic half numerous and subconcentric; the caudal half moderately deeply, closely punctured, densely on the sides; the median line smooth, and narrowly carinate from the summit to the base; the lateral oblique depressions connected across the dorsum.

The *elytra* are elongate, with the sutural striæ slightly, broadly impressed, a little more widely behind; the other striæ not impressed; the stria punctures very small, moderately close and deep; the interstria punctures nearly as large and nearly as close as those of the striæ, finely granulate behind; the suture elevated except at the base and granulate towards the declivity. The *declivity* convex from the side, steep, the sutural striæ deeply widely sulcate, wider towards the apex, terminated before the apex of the elytra by the obtuse, narrow, apical projection; shining, very minutely rather sparsely punctured; with a few minute denticles on each side in the usual position on the crest of the lateral convexity, the 1st on the end of the 2nd interspace, the 2nd on the 3rd interspace, and two close together on the 5th and 6th interspaces. The second visible abdominal sternite is as long as the two following ones united. The male has the front as in the female; it differs only in having the declivital denticles of the 2nd, 3rd and 6th interspaces developed into small acute teeth, and the declivital impression apparently deeper thereby. The genitalia have the "trough" a very long spiral band and the processes (feet) very long and slender, very much as in *sparsus*.

This species is of the size of *jasperi*, but more slender, and is allied to the species of *Pityokteines* in the small size, the elytral punctuation, the poorly developed apical projection of the elytra, the long second visible abdominal sternite, and the characters of the male genitalia. The antennal club, however, although flattened considerably, has the apical segments incompletely telescoped, showing distinctly at the apex from the upper side, the apex of the declivity, too, is distinctly though obtusely margined; and the female lacks the strong tuft of hairs on the front; these characters unite the species rather definitely with the genus *Orthotomicus*.

Type series from Rogers' Pass, British Columbia, abundant in *Abies lasiocarpa*; Edmonton, Alta., abundant in *Larix americana*. The type is in the collection of the Entomological Branch, Ottawa.

***Orthotomicus ornatus*, n. sp.**

This is a small elongate species, allied to *sparus* (*balsameus*) Lec., and also to *calatus* Eichh.

Description of the male—Length, 2.3 mm. The head has the front convex, closely, rather coarsely granulate, with the median carina nearly obsolete, the hairs long but sparse; the antennal club about as wide as long, thickened basally, the apical half strongly obliquely truncate, the first suture recurved, with the apical segments almost completely telescoped, showing only one suture at the apex, on the upper surface.

The *pronotum* is distinctly longer than wide, with the sides straight to well beyond the middle, then narrowed to the broadly rounded front margin; coarsely very sparsely asperate and finely granulate, moderately punctured behind, closely on the sides, rather sparsely on the disc, with a smooth medium space becoming narrow and slightly carinate towards the summit.

The *elytra* have the sides straight and parallel for four-fifths the length; then semicircularly rounded behind as viewed from above; the striae narrow, straight, regular, and slightly impressed; the sutural striae slightly wider and more strongly impressed on the disc, still more strongly behind, but not widened before the declivity; the striae punctures rather large except towards the base, regular, quadrate, and *very closely placed*; larger and closer behind; the interspaces nearly flat, those of the disc wider than the striae in front and narrower towards the declivity, uniseriately punctured, the punctures rather numerous, about 12 on the discal interspaces between the base and the top of the declivity, the punctures very small in front becoming as large and close as those of the striae and granulate near the declivity. The *declivity* is vertical, moderately concave, somewhat less deeply than the male of *sparsus*; densely, coarsely punctured and hairy; with three acute teeth on each elytron, the first tooth minute, on the second interspace; the second extremely coarse, stout at the base, acute, incurved, on the third and fourth interspaces, much closer to the first tooth than to the third; the third smaller, slender, straight and acute, on the sixth and seventh interspaces; the second and third on the margin of the declivity, which is completed laterally

by a subacute arcuate ridge connecting the second and third teeth; with a small denticle on the end of the fifth interspace at the base of the second tooth; the apical margin of the declivity narrowly separated from the elytral margin, moderately acute, entire, extending across the suture.

The female has the front closely coarsely granulate-punctate, with a narrow median carina on the caudal half developed into a compressed tubercle at the cephalic end on the centre of the front, and with a deep transverse impression between the tubercle and the margin of the epistoma; the declivity nearly vertical, similar to that of the male, but much less deeply concave; the sutural striae still distinctly but much less deeply and broadly sulcate, and the sides of the declivity less elevated and less distinctly margined; the apical margin feeble, barely distinct at the suture; with smaller teeth, situated much as in the male, on the convexity laterad of the sulcus, but in a straight oblique line, the first minute, the second and third alike, small, conical and acute; the concavity densely, coarsely punctured and hairy as in the male. The second visible segment of the abdomen is as long as the next two united.

This species unites the characters of *Orthotomicus* with those of *Pityokteines*. It is allied to *Orthotomicus* in the frontal secondary sexual characters, and in the fairly distinct apical margin of the declivity; but rather closely to the typical *Pityokteines* in the small size, long second visible abdominal sternite, and frequently by the characters of the somewhat variable antennal club.

It is represented in our collection as follows: A short type series from Williams, Arizona, in the Cornell Uni. Collection, No. 302, sub. 100; a short series from Oregon sent by Professor H. F. Wilson; a short series from Tulare, Co. Cal., taken by Mr. Ralph Hopping in *Pinus ponderosa* and *Pinus jeffreyi*. The type is in the collection of the Entomological Branch, Ottawa.

***Ips chagnoni*, n. sp.**

Description of the male—Length, 4.7 mm.; width, 1.75 mm.; larger and stouter than its close ally, *grandicollis* Eich., sides of prothorax and elytra nearly parallel, pronotum slightly wider than the elytra; clothed with stiff, erect, reddish hairs, thick

about the sides, front of the pronotum and margin of the declivity, sparse on disc of pronotum and disc of elytra.

The front of the *head* is much as in *grandicollis*, but more coarsely sculptured, with a median coarse granule near the epistomal margin, succeeded by a broad median impression, and this by the wide smooth median line; the antennal club has the sutures rather broadly but strongly angulate.

The *pronotum* is distinctly but only moderately longer than wide, broadly rounded behind, with the hind angles oblique; the sides subparallel to the middle, then obliquely narrowed and broadly rounded in front; the asperities of the cephalic half rather small and concentric near the summit; the caudal part smooth and shining, rather finely and moderately closely punctured on the disc, with the smooth median space obsolete except at the centre of the disc, closely and more coarsely punctured on the sides.

The *elytra* are punctate-striate, with the striae slightly impressed on the disc, excepting the sutural striae, which are very deeply impressed and wider behind, with the punctures larger, closer and transverse; the punctures of the remaining striae of medium size, circular and more closely placed on the disc; the interspaces flattened, excepting the first two, which are distinctly convex; all the interspaces confusedly punctured and granulate at the margin of the declivity; the lateral interspaces closely uniseriately punctured, with punctures as large as those of the striae, the punctures confused at the base, near the declivity, and on the last two interspaces; the discal interspaces more sparsely punctured, the first rather closely uniseriately punctured throughout and granulate near the declivity, the second punctured only near the declivity and the base, widest and the most strongly convex; the third with three widely separated punctures in addition to those at the base and near the declivity; the fourth punctured forward to the middle and again at the base; the fifth sparsely punctured at the base and closely towards the declivity; and the remaining interspaces closely punctured; the elytra rather densely clothed with stiff reddish hairs on the sides and around the margin of the declivity, with a few hairs along the base, and very sparsely hairy on the disc. The *declivity* is deeply excavated, coarsely,

not densely, confusedly punctured, with numerous minute hairs, thicker and longer near the margin and on the strongly raised suture; the declivital armature nearly as in *grandicollis* Eichhoff; the first tooth small, acute, on the end of the second interspace; the second, on the fourth interspace, large, acute, the apex directed dorso-mesad with the caudal margin crenulate and nearly vertical, connected at its base with the third tooth, which is stouter and longer, blunt and somewhat curved meso-caudad; the fourth and fifth teeth smaller and acute, on the declivital margin between the 3rd and the acute apical margin, which is narrow, acute, and raised almost to the level of the tips of the 4th and 5th teeth.

The *female* is somewhat less coarsely sculptured on the front and declivity.

There is considerable variation in the punctuation, and the discal striæ of the elytra are frequently decidedly impressed, with all the discal interspaces convex. The length varies from 4 mm., to 5.2 mm.

This species is distinct from *grandicollis* Eich. in the larger size, stouter form, shorter pronotum, and confusedly punctured interspaces near the declivity; from *vancouveri* and *confusus* by the very sparse punctures on the basal half of the discal interspaces.

The species is abundant in Ontario and Quebec Provinces, chiefly in *Picea canadensis* and *Pinus strobus*; it extends southwards into New York State. The type is from Montreal Island, P. Q., collected by Mr. G. Chagnon, of Montreal, and is deposited in the collection of the Entomological Branch, Ottawa.

***Ips vancouveri*, n. sp.**

Description of the male— Allied to *confusus* Lec., but stouter, densely hairy, and much more coarsely sculptured; length, 5.5 mm.; colour, dark reddish brown.

The *head* has the front evenly convex, coarsely rather sparsely granulate, more finely and densely on the sides; the epistoma transversely impressed, with a narrow median emargination; with a compressed, short, blunt median tubercle at the base of the epistoma, followed by a small median impression, and the smooth median line obsolete; the vertex shining and nearly smooth; the

sutures of the antennal club very strongly angulate at the middle; the pubescence of the front close, long and erect.

The *pronotum* is distinctly longer than wide, widest at the base, with the sides slightly arcuately narrowed for two-thirds the length, then strongly narrowed to the narrow but broadly rounded front margin; subconcentrically, not very densely asperate in front; the pubescence abundant and long about the sides and in front; closely, rather coarsely and deeply punctured behind, more closely on the sides.

The *elytra* are as wide as the pronotum, with the striae strongly impressed on the disc, distinctly impressed on the sides; the sutural striae deep and wide, deepened towards the base, and widened behind; the striae punctures coarse, close, deep and quadrate, smaller near the declivity, the discal interspaces strongly convex and coarsely roughly punctured, not closely near the base, densely and confused on more than the caudal half, and granulate about the declivity; the lateral interspaces with the punctures less coarse but very densely confused throughout; the first interspace closely confusedly punctured and uniseriately granulate; the second interspace the widest, sparsely punctured in front, closely, confusedly granulate-punctate on more than the caudal half and with a row of acute granules terminating in the first declivital tooth, *which is much closer to the second tooth than to the suture*; the declivital teeth otherwise nearly as in *confusus*, but distinctly coarser, the 2nd tooth conical acute, with its caudal margin sinuate and nearly vertical, close to the 3rd, which is stout, subcapitate and curved downwards, the 4th and 5th conical, on the margin of the declivity between the 3rd and the narrow, strongly produced apical margin; the concavity densely, deeply, rather finely punctured, and densely clothed throughout with long slender pale hairs; the elytra densely clothed with long hairs, more sparsely on the disc.

The female has the frontal tubercle of the male represented by a slight median episternal carina, followed by a median shining impressed area, and the declivital teeth less strongly developed.

The species occurs in Sitka spruce and western white pine on Vancouver Island and the coast of British Columbia; it occurs

at Kaslo, B. C., and probably elsewhere in the interior. The type is from *Pinus monticola*, Quathiaski Cove, B. C.

The size varies moderately, from 5 mm. to 5.7 mm. in length; the colour, from dark reddish to black; the punctuation from coarse to moderate in size. The type is in the collection of the Entomological Branch, Ottawa.

***Leperisinus californicus*, n. sp.**

This species is allied to *aculeatus* Say, of the same size and shape, with the yellow-grey markings very distinct.

Description of the female—Length, 2.5 mm.; colour, black, with the apex of the pronotum, the base of the elytra, the scape and funicle of the antennæ and the legs red, and the pronotum and elytra distinctly marked with areas of yellow-grey scales. The head has the front broadly moderately concave in front, convex towards the vertex; very finely reticulate and moderately shining; finely granulate-punctate, sparsely in front, with closer, shorter, erect, dark, plumose hairs behind, the epistoma bearing very long, upcurved, slender, plumose hairs, and from the margin a dense fringe of very long, simple, orange-coloured hairs; a sub-triangular area behind the epistoma more brightly shining and with a faint trace of a median carina; the antennal club pubescent, elongate oval, moderately compressed, with the sutures transverse, the last oblique.

The pronotum is very much wider than long, strongly arcuate on the sides and very strongly narrowed in front to the very broadly rounded but not emarginate front margin; with coarse, shallow punctures, finely scabrous on the median area, with rather numerous coarse, lunar rugosities on the middle of the sides, ending in front in a submarginal row of rugosities connecting the lateral dark areas; the colour-markings somewhat as in *aculeatus*, with a black lens-shaped, longitudinal, median area, clothed with elongate, plumose, dark-coloured, almost invisible scales, intermixed with stout plumose hairs; with a longitudinal, narrow, irregular, medially widened, black area in the middle of each side and the remainder of the disc densely clothed with very wide, flat, yellow-grey, plumose scales, with a few stout plumose hairs intermixed, the

scales gradually becoming stout plumose hairs on the ventral surface and along the front margin.

The elytra are shaped much as in *aculeatus*, strongly elevated, arcuate and serrate on the basal margin, and narrowly rounded behind as viewed from above; the declivity very strongly oblique, from the side, so that the median line of the elytra is almost evenly broadly arcuate in profile from the middle to the apex; clothed with scales and erect hairs; the striae very narrow, slightly impressed; the strial punctures small and indistinct; the interspaces wide and nearly flat, on the disc slightly convex towards the base; the suture elevated on the caudal two-thirds, and the third interspace convex, more strongly on the declivity; the interspaces with uniseriate coarse rugosities, becoming lunar and more numerous at the base and more acute behind; densely clothed with very wide, often subcircular, flattened, plumose scales which become stout plumose hairs at the base, long, conspicuous and usually black on the caudal two-thirds of the sides, very slender near the side margin, becoming very large, erect, widely spatulate scales behind on the disc, longer and densely placed on the first and third interspaces of the declivity, making those interspaces apparently carinate, nearly obsolete on the second declivital interspace; on the disc the vestiture coloured in three yellow-grey bands alternating with three dark subtransverse bands; the first band black, suffused with reddish, basal; the second band pale, wide, from the suture to the side margins, extending irregularly backwards on the side, with the pale section of the first interspace attaining the scutellum, that on the second extended farther behind, that on third nearly obsolete; the second pale band, the fourth from the base, is a subquadrate blotch on the 2nd, 3rd, 4th and 5th interspaces, extended forward on the 5th and connected diagonally by scattered pale scales with the base of the first pale band, evidently the remnant of a strongly oblique pale band, surrounded by the 3rd and 5th bands, which are black, and meet on the middle of the side to be extended irregularly to the side margins; the third pale band, the sixth from the base, is transverse, apical, with a narrow extension forward on the 4th and 5th interspaces nearly to the 2nd pale band, and connected by scattered pale scales with a caudal extension of the 1st pale band on the 8th interspace.

The ventral surface is strongly inflated at the metathorax, the abdomen strongly oblique from the metathorax to the apex; the last segment strongly flattened and the last three sutures very deep; clothed with greyish, stout, plumose, scale-like hairs with slender plumose hairs intermixed towards the middle line, with a *dark area* covering the last two segments and the caudal border of the 3rd densely clothed with erect black hairs.

The male has the front less concave, with a well-developed acute postepistomal median carina, with the hairs on the epistoma short except the marginal fringe, which is moderately long.

Labels with the type: San Diego, Cal., 7-18-15, olive, ♀. Adults and work in olive branches were received from Professor E. O. Essig and Dr. E. C. Van Dyke. The species was taken from living olive trees, at San Diego, Cal., in 1914, and was causing much injury to the host. Two specimens of the same species were received from Mr. Ralph Hopping, taken by him on brush in the chapparal belt, Camp Greely, Fresno Co., Cal., 3,000 ft., in 1909.

The type of this species is in the collection of the Entomological Branch. Ottawa.

THE NYMPHS OF *ENALLAGMA CYATHIGERUM* AND *E. CALVERTI*.

BY E. M. WALKER, TORONTO.

The nymph of *Enallagma cyathigerum* Charp. has been described by Lucas ('00)¹ and Ris ('09)², that of *E. calverti* Morse by the present writer ('13)³. No description of the nymph of the former species based on American specimens has, however, yet appeared, and this has been a desideratum for two reasons.

In the first place the American form of *cyathigerum* was originally described as a distinct species (*E. annexum* Hagen), and has been frequently cited under this name, or as *E. cyathigerum* race *annexum*, and although Williamson ('02)⁴ pointed out its identity with *cyathigerum*, and has been generally followed, the question of the validity of *annexum* as a race has always seemed to me not indisputable. I have examined a large number of Canadian specimens from a very wide range of territory and also a number of European examples, and, although I regard them all as one species, I have never had any difficulty in separating the

males of the American form from those of the European form by the shape of the abdominal appendages. The difference is slight, but constant in the material I have examined.

In the second place, having recently reared *cyathigerum* at Toronto, I find that the nymph does not wholly agree with Ris' description and figure (I have not had access to Lucas' description), but that, on the other hand, it is so extremely like that of *calverti* that a comparative study of these forms is necessary in order to make their separation possible.

Early in June, 1914, I found *E. cyathigerum* in considerable numbers at "Fisherman's Island," a long narrow sand bar, south of the city, which separates Ashbridge's Bay from the open lake, and, until recent filling-in operations commenced, was margined on the inner side by a wide extent of marsh. It proved too late to obtain the nymphs that season, but on May 24 of the following year a visit was made to the same spot and about twenty mature nymphs were secured. They were accompanied by large numbers of *E. hageni*. On May 26 a male *cyathigerum* emerged, and as the identity of the nymphs was now assured, the remainder was preserved for study. Imagos had already become quite numerous on the island, and soon became abundant. A large number were examined, but all were alike; no specimens of *calverti* were found among them. Shortly afterwards they disappeared and were followed, as in the previous year, by swarms of *E. hageni*.

During the season of flight of *cyathigerum*, *E. calverti* was common about a pond in the vicinity of my house in Wychwood Park, Toronto, and I reared this species again here, as I had previously done at Lake Simcoe and Go-Home Bay, Ont. I was thus able to obtain sufficient material for a comparison of the nymphs of the two species.

The Nymph of *Enallagma cyathigerum*. (Pl. IX).

Very similar to *E. calverti* Morse in size, form and coloration (v. Can. Ent., XLV, 1913, p. 162, pl. 1, figs. 4, 5). Head as in

1. British Dragonflies, pp. 297-307.
2. Die Süßwasserfauna Deutschlands. Heft 9, Odonata, pp. 50, 54.
3. Can. Ent., XLV, No. 6, p. 162.
4. Proc. Acad. Ind., p. 121.

E. calverti, differing from that of *E. hageni*, *E. ebrium*, *Ischnura verticalis* and *Cænagrion resolutum* in the somewhat more prominent eyes and postero-lateral surfaces of the head, these parts having a somewhat more strongly sinuate outline in dorsal view (cf. Can. Ent., *l.c.*, figs. 4, 6). Labium of the usual form in this genus, the lateral margins in about the proximal two-thirds straight and diverging at an angle of about 30° , in the remainder at about 70° , breadth at the base of lateral lobes four-fifths of the length; mental setæ 4, sometimes 3 on one or both sides, lateral setæ 6; lateral lobes of the usual form, the end-hook preceded by 2 or 3 teeth, which are preceded by a more or less denticulated and incurved margin. Spinules on lateral margins of abdominal segments of moderate size, forming an irregular single or partly double series and not increasing much in size near the postero-lateral angles.

Gills long and relatively narrower than in *E. hageni*, the margins of a little less than the proximal half spinulose, the spinules somewhat coarse, particularly on the dorsal margin of the median gill and the ventral margins of the lateral gills, distal margins with moderately long slender hairs; apices convexo-angulate or rounded. The greatest breadth is just before the distal end of the spinulose margins, measuring between one-fourth and one-fifth (median gill) or one-fifth and one-sixth (lateral gills) of the length. Beyond this point the gills are suddenly, though slightly, narrowed.

The lateral appendages (superior appendages of adult) differ in form in the two sexes. In the male, they are rounded and somewhat depressed, in profile about half longer than deep, and, when viewed obliquely from above, they present a distinct, though shallow, dorso-caudal concavity; viewed directly from above, they appear about as broad as long with convex margins, especially the outer. In the female, these appendages are subpyramidal, tapering to a blunt apex, the outer margin in dorsal view nearly straight, the inner margins somewhat more convex toward the base.

Colour—Olivaceous or brownish-green (brownish-yellow in alcoholic specimens), generally nearly uniform, but frequently more or less speckled with dark irregular spots, the abdomen

usually with diffuse, dorsal longitudinal dark band, divided by a pale median line, and sometimes with a definite row of dark spots on the sides, legs pale, femora with a darker anteapical annulus, which may be faint in pale specimens. Gills generally diffuse greyish-brown, sometimes very pale, sometimes quite dark, typically with three or four narrow, transverse, somewhat angular bars about the middle or slightly beyond, following one another closely and sometimes partly confluent, the first band usually the most distinct and in very pale specimens sometimes the only one present. In well-marked specimens there may be an indication of another band farther distad, and in dark specimens there may also be considerable pigmentation along the tracheal branches and sometimes dark blotches independent of the tracheæ.

Length of body 21-21.5 mm.; hind wing-pad 4-4.8 mm.; hind femora 3.8-4.4 mm.; gills 7.5-8.5 mm.

As in the case of the adults, the nymphs of *E. cyathigerum* and *calverti* differ apparently only in one constant character, the form of the superior (lateral) abdominal appendages of the male. In the nymph of *calverti* these appendages in profile appear fully as deep as long, with a much broader and more bluntly rounded apex, which is somewhat above the mid-longitudinal axis. The sulcation seen in *cyathigerum* in an oblique view from above is not present in *calverti*. The outline of the appendage viewed directly from above is less rounded than in *cyathigerum*, the outer margins being but slightly curved, and passing into the posterior margins by a rounded angle. There is a distinct submedian longitudinal ridge.

Ris' figure of the gill of a European specimen of *E. cyathigerum*, reproduced from a photograph, differs considerably from the gills of my specimens, being more like those of *E. hageni* and *E. ebrium* in form. It is little more than three times as long as broad; the margins are more evenly convex, and the marginal spinules appear decidedly smaller, those of the stronger series not interrupting the curve of the margin as in American specimens and in *E. calverti*. In Ris' figure, the gill is broadest beyond the apex of the spinulose part of the margins, while in American specimens the greatest width is just before this point. The gill is also described as having no transverse bands and none appear on the figure.

EXPLANATION OF PLATE IX.

Figs. 1-5, *Enallagma cyathigerum*, Charp., nymph; 1, median gill; 2, lateral abdominal appendages of female, dorsal view (median gill removed); 3, lateral abdominal appendages of male, dorsal view; 4, right appendage of male, profile view; 5, same, dorso-lateral view. Figs. 6-8, *Enallagma calverti* Morse, nymph; 6, lateral abdominal appendages of male, dorsal view (median gill removed); 7, right appendage of male, profile view; 8, same, dorso-lateral view.

GEOFFREY MEADE-WALDO.

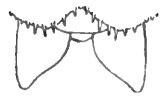
All who attended the Jubilee Meeting of the Entomological Society of Ontario in August, 1913, remember, among other pleasant recollections of that meeting, the pleasure which the presence of Mr. Meade-Waldo occasioned; Mr. Meade-Waldo attended the meeting as a representative of the British Museum of Natural History. To all those and to his other friends in Canada his untimely death in March will come as a shock. He had a peculiarly winning manner and a deep love not only of the science to which he chiefly devoted himself, but to nature generally, as he was a keen ornithologist and an ardent advocate for the preservation of wild life. His enthusiasm was very marked during the excursion we made at the time of the meeting to Grimsby, from which excursion he arrived home not only with his hands full, but, in the absence of a third prehensile organ, carrying in his mouth a twig bearing a Sphinx caterpillar.

Mr. Meade-Waldo was born in January, 1884, and after being educated at Eton and Magdalen College, Oxford, he visited the East, including the Federated Malay States and Borneo. In 1909 he was appointed to the Entomological Department of the British Museum, Natural History, where at the time of his death he had charge of the Hymenoptera. In this group he had already carried out valuable and much-needed work, and his death will be a severe loss not only to British entomology, but to a still wider body of entomologists who were following his promising career with great expectations.

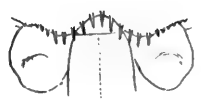
C. GORDON HEWITT.



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2



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6



4



7



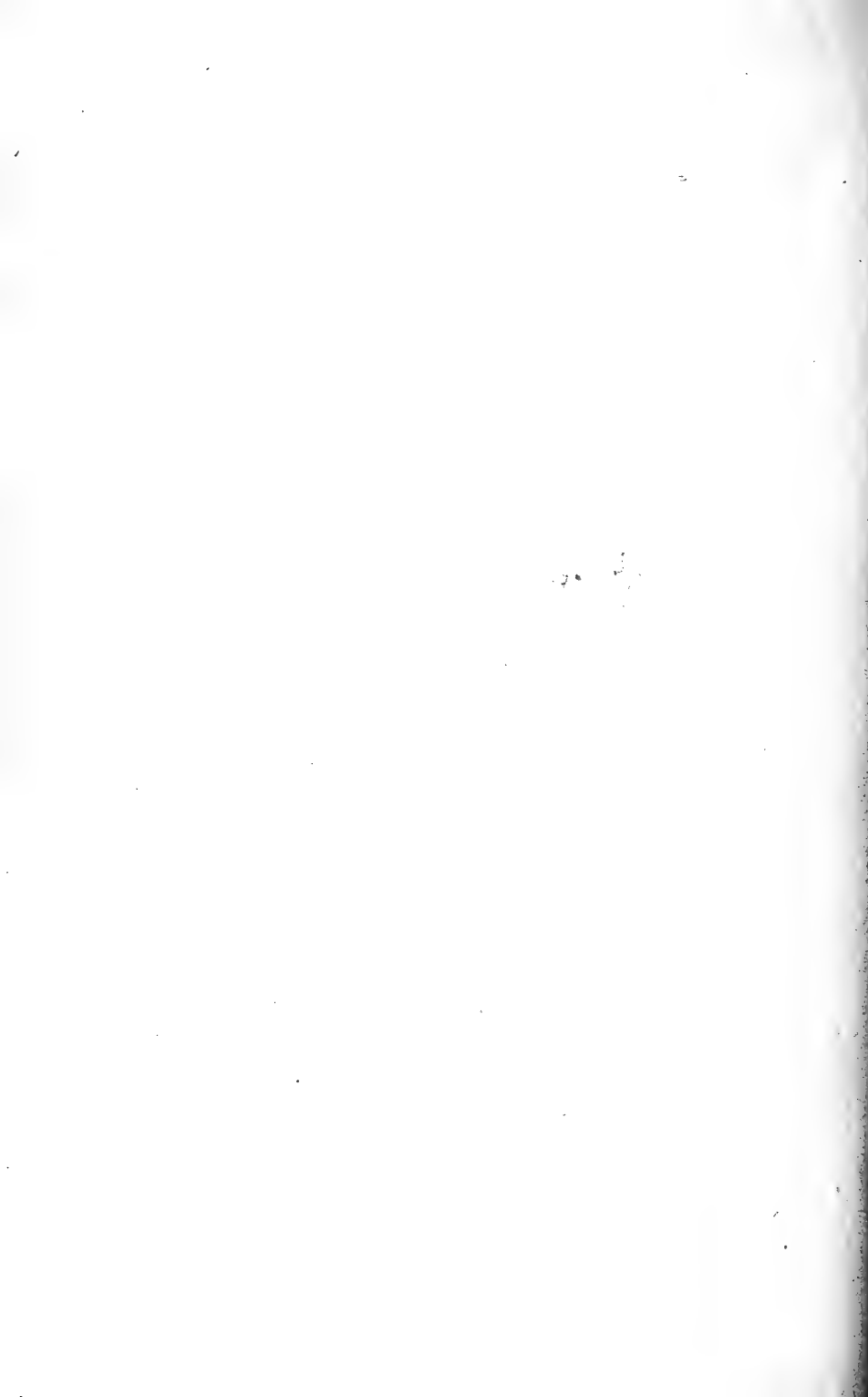
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5

NYMPHS OF ENALLAGMA CYATHIGERUM AND
E. CALVERTI.

(Page 193.)



POPULAR AND PRACTICAL ENTOMOLOGY.

FRESH WOODS AND PASTURES NEW.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

II.

Just east of the city, overlooking the Lift Lock, stands a high hill, bare of trees. Yet even this naked hog's back has points of interest; for example, a month ago I discovered that a strange family had established squatter's rights on the face of it; they had come from the far west, but whether hobo-fashion, bumping it along the railway, or as stowaways in one of the large grain boats so often seen (by politicians and farmers) plying back and forth on the Trent Valley Canal, I do not know. Their godfather was a Russian, Hieronymus Grindel, and Gray describes them as "rarely adventive" eastward; rare or not, they have certainly arrived at Peterborough and come to stay: *Grindelia squarrosa*, the Gum-plant or Tar-weed. But the chief point of interest in this hill just now is the extensive view it affords of Peterborough's environs. It was from its summit as a vantage ground that I first spied a long stretch of thickly wooded country, about a mile south of the Lift Lock and running east as far as the eye could see. The nearest point in this line of forest is Burnham's wood.

My first expedition to this discovered a number of newly-felled pines on a side-road near the Burnham farmhouse and orchard. These were visited two or three times in June, and besides the common Monohammi, Clerids and Buprestids of the white pine, I captured seven specimens of *Acanthocinus obsoletus*, a light grey beetle with extremely long antennæ; it is very fond of resting on the under side of the trunk of pine trees in their first season of decay. I once captured nearly a score of these in the first half of June on a single pine, that in falling had lodged in the crotch of a neighbouring tree. I took also five specimens of a *Neoclytus*, which I think is *longipes*: head, thorax and body black, with three grayish-white lines of pubescence on each elytron; viz., a vertical crescent at the base, an oblique median line, and a transverse wavy line near the apex. I have taken it before on white pine, and have never found it on any other tree; the kindred species, *erythrocephalus*, reddish-brown in colour with yellow marks

on the elytra, prefers hardwoods, especially oak, hawthorn and maple. Towards the end of June I captured on the same pine trunks a specimen of *Leptostylus sex-guttatus (commixtus)*.

Rather nearer the wood was a swamp of willow and alder, and early in June, while testing out the local distribution of *Chrysomela*, I spied the graceful outline of a longicorn's antenna projecting over the edge of an alder leaf just above my head. The sun was near the zenith, and I could see through the leaf the oblong shadow of the insect's body. By mounting on a large overturned pine stump I could just reach up to the leaf and carefully closed my finger and thumb over the quarry. I then broke off the leaf with my free hand and succeeded in transferring my capture to the cyanide bottle. To my surprise this proved to be a pair of longicorns—the male barely a third the size of the female. I had never seen the beetle before. It was *Batyle ignicollis*, but, so far, I have been able to learn nothing of its life-history.

The wood itself was a somewhat low-lying hardwood with hemlock intermingled; a couple of paths ran through it that had been used in the spring at the gathering of maple sap. Near one of these paths were some stumps and also a large fallen tree of basswood. The first find I made was in fresh fungus on one of the stumps. Here I captured fully a score of a certain staphylinid: apparently all in the same colony, yet (according to cabinet methods) there were specimens here of five or six species. I am glad to see that Blatchley is suspicious of this unnatural system of classification. If there is any value in field observation, his suspicions are more than justified. The beetle was *Oxyporus*, and my specimens showed every sort of gradation from black to yellow, answering to three or four of Blatchley's specific descriptions, and probably several others not given in Blatchley. Half of them, no doubt, simply varietal and based on a single capture.

About the sheaf of leaves sprouting round the stump I took one or two specimens of *Saperda vestita*, and, on the trunk of the fallen basswood in the first week of June a treat was in store for me that I had not had for seven years or more, immense numbers of the basswood *Saperda* emerging from the bark or ovipositing on the trunk. There is a certain season, early in June, and no other (in my experience) when this sight is possible. Two or three

days later, and this tree showed hardly one insect for every score at the earlier date.

It was quite early in June, too, that I found, resting on the underside of a limb of the tree, very hard to discern in the shadow, a fairly large grey beetle; about the size of *Urographis fasciatus*, but abundantly distinct (when the two are set side by side); moreover, what to me seemed more important than all, frequenting basswood. Often as I have found *Urographis*—sometimes in considerable numbers—it has always been on oak, maple, or some other tree with exceedingly hard and close-fitting bark. So I set representatives of six or seven related genera, including the true *Urographis*, alongside of my stranger. The elytra of this latter were rounded at the tip, the hind tarsi all small, and the scape of the antennæ short and bulging; it was most like *Acanthoderes*, or *Acanthocinus*. These, unfortunately, were at opposite ends of the Tribe *Acanthoderini*; the subdivision of genera in the tribe is based on the shape of the antennal scapes. In my beetle these were strongly clavate. Apparently, then, it was *Acanthoderes*; but that genus proved to have dorsal tubercles. My beetle had three shining black spaces on the disk of the thorax, corresponding in size and position to such tubercles, but not in the least gibbous. I then went a step further back to the tribal distinction (between *Acanthoderini* and *Pogonochærinini*); this depends on the shape of the front coxal cavities. With some misgiving, I immersed one of my three specimens of the beetle in hot water—a baptism which fortunately did no damage. As soon as the joints were relaxed and the surface dry, I went on with my scrutiny. The coxal cavities were distinctly angulated. I turned to the Tribe *Pogonochærinini*, and had the joy of identifying beyond a shadow of doubt, even to the species, and that from LeConte and Horn's masterpiece of generic classification; *Hoplosia nubila*: a beetle *sui generis*, so that the description in the key was no less than a detailed etching of the very object before me. The description tallied in every stroke, and to cap it all I found the following notes: In LeConte & Horn—"the genera of this tribe are dispersed by Lacordaire among three groups; the genera have a characteristic habitus, with the exception of *Hoplosia*, which resembles a *Graphisurus*, but with the antennæ of *Acanthoderes*; and in Blatchley—" *Hoplosia nubila* is said to breed in dry twigs of beech and LINDEN."

On a second visit to this tree in the first half of June I had the good luck to capture a second specimen, and this year at the same date on a similar log in a wood farther east I captured a third.

At the end of June, some miles west of Peterborough, on a torn limb of basswood (in which the sap was probably fermenting) I took a specimen of *Leptostylus macula*, and out of curiosity revisited the tree in Burnham's wood. Here on one of the upper branches I found—apparently waiting for me—its duplicate.

In this same month of June, while following a path through the wood, I caught sight of a very beautiful chrysalis fastened to the underside of a leaflet of butternut. It was short and broad, white with black markings; it appeared to be thick through and ornamented with ridges or prominences on the face of it; visions of a brand new chrysomelid floated before me. Unfortunately the leaf of butternut was firmly attached to a stem 12 or 14 feet up the tree. As I circled round the base of it, with my eye glued on the chrysalis, no doubt I made a good picture for an up-to-date version of Æsop's fables—The Fox and the Grapes. Well, there was no help for it! If I wanted that chrysalis, I'd got to climb. The revival of a long disused habit—like that of climbing trees—sometimes recalls interesting memories. It is said that the late Prof. Bain, of Aberdeen, soon after the publication of Darwin's "Descent of Man," was found crawling about his study floor in the hope of recovering some of the long-lost sensations of primitive man before he assumed the erect habit. Who knows but that I might, on the same atavistic principle, retrieve some arboreal memory from quadrumanous ancestors as they swung nimbly down the forest aisles. Here goes, anyway! and I approached the tree. Somehow it didn't look so simple as speeling up the drying-green posts at the age of ten; for one thing, it seemed hard to get close enough to the tree to embrace it; but, as soon as I laid my cheek to the bark and threw my arms about the stem, my shins and feet seemed to correlate instinctively, and up I swarmed. Nor was it so much force of gravity that stopped me half way up, as the ludicrous thought of a new chapter in Dickens, adding yet another to the long list of undignified attitudes involuntarily struck by the immortal Samuel Pickwick. Assuredly if anyone

caught me before I caught that chrysalis, I should be haled off to the nearest lunatic asylum. The thought of the chrysalis spurred me up the few feet remaining, and when I did slide down to the ground, it was not empty-handed. The discovery of three more of these pupæ, not many yards further on and within easy reach, was a trifle disconcerting; but if (I reflected) this did eventually prove a new beetle, four specimens were none too many. Little did I know then that hundreds of this creature—a regular colony—were hiding in the bushes just round the corner, chuckling up their sleeves, probably, at the amazing spectacle of Pickwick heaving his bulk up a butternut tree. Its very name, when I came to discover it, seemed a piece of mocking irony—*Anatis*, the Innocent.

I followed the path along to the north end of the wood, through a belt of cedars, to look at a fine colony of Adders' Tongue Fern, and then turned west. After skirting the edge of the wood for a space, the path presently dipped in again among the trees. Here and there I passed a glade grown up with Early Elder, and suddenly was arrested by a gleam of bright prussian blue and yellow among the leaves. This contrasted colour-scheme characterizes one of the moths as well as a Lampyrid beetle; and more than once I had been disappointed in this way, when I fancied myself stalking and about to bag the famous Elder-borer (*Desmocerus palliatus*). But to-day must have been my lucky day, or some of the Little People had admired my efforts at tree climbing and were determined to reward me as only fairies can. It was no changeling grass-moth or fire-fly this time, but the genuine Knotty Cloak. On the same shrub I found a pair of these borers a moment later, and in the little glade, among the thickets of Elder, I captured seven specimens of this beautiful beetle in about an hour—always on the under side of the foliage or crawling on the stem. I don't think I looked for any thing else all the afternoon than the Early Elder, and I returned home with fifteen of the beetles. Once I knew where and when to look for the Elder-borer, it became a common capture. That season I took over seventy, between June 20 and July 25, nearly always on Early Elder growing in woodland glades, and generally on the foliage. It is not so frequent a borer in the Late Elder, and I have never found it on the flower-clusters of that plant, which blossoms at the end of June.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN
AND THE
DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY FRED. V. THEOBALD, M.A.

(Continued from page 177.)

Aphis kochii Schonteden (nov. nom.).

Aphis pyri Koch (non Boyer de Fonscolombe).

Aphis sorbi Walker, Sanderson, etc. (non Kaltenbach).

Aphis mali Buckton (part) (non Fabricius).

Aphis pyri-mali Fabricius (part).

Aphis malifoliæ Fitch* (and Thomas).

Myzus mali Ferrari (part).

Aphis pyri Gillette and Taylor (non Boyer).†

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Theobald, Ins. and Allied Pests Fruit, p. 136, figs. 105, 109, 110, 1903.

Theobald, Rept. Eco. Zool., 1910, p. 35, 1911.

Gillette and Taylor, Bull. 133, Colo. Agri. Exp. Sta., p. 31, 1908.

Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914.

NOTE.—Joshua Major, in his "Treatise of the Insects Most Prevalent on Fruit Trees, Etc." (p. 10, 1829) mentions Apple Aphides of various kinds, and evidently refers to this species, and not to *A. avenæ*, as has been suggested.

*Oestlund (Aphid. Minn. p. 64, 1877) thinks this a variety of *mali* but his *mali* is certainly *avenæ*.

†Gillette and Taylor called this *pyri* after Koch's description, but Boyer's *pyri* antedates Koch's.

DESCRIPTION.

Alate viviparous female (spring form).

Head black. Thorax shiny black. Abdomen dull reddish of various shades at the base, sometimes yellowish red, with four black lateral spots and a black area on the posterior region, with 3-4 lateral tubercles before the cornicles. Antennæ black, not quite as long or nearly as long as the body; first segment longer than the 2nd; the 3rd with many sensoria over its whole length (47-60); the 4th scarcely longer than the 5th, with many sensoria over its whole length (27-35); the 5th with 3-0 sensoria on the basal $\frac{3}{4}$ and the usual sub-apical one; the 6th a little longer than the 3rd; the last three segments imbricated. Cornicles black, cylindrical, moderately long, imbricated. Cauda small, dusky. On the 7th and 8th abdominal segments are two pairs of dorsal tubercles. Legs with yellowish-brown trochanters; bases of femora and tibiæ pale, apices of the same dark. Wings with brownish veins and paler insertions; venation often very variable.

Length—2 to 2.5 mm.; wing expanse, 7-8 mm. Sanderson says "abdomen yellowish-red," and figures it with only four pairs of dark lateral spots. All European specimens have a large dark abdominal area, as in the return migrant.

Alate viviparous female (return migrant).

Head and thorax black. Abdomen reddish, with a large dark dorsal area of various extent, often extending from close to the thorax up to the cornicles,* at others time quite small; black transverse bars caudad of the cornicles, and three large black lateral spots before the cornicles and traces, more or less distinct, of one caudad of them. Antennæ black and similar to the spring form. Legs and cornicles the same as the spring form. No trace of the four tubercles on segments 7 and 8 of the abdomen, according to Sanderson; but I have found them in all British specimens I have examined. Rostrum reaches to the second pair of legs. Cauda dark, small.

Apterous viviparous female.

Colour varying from slaty-grey to bluish black, plum colour, brown, brick-dust red, pink, rosy and almost black. The young

*Now and then almost black specimens occur.

may be yellowish pink, some bright pink, to brick-dust red; others almost green, or yellowish green. A few mottled or darkened at the sides. The mature female is usually a slaty-grey or dull bluish black covered with much whitish meal; form globular.

The pronotum has two blackish tubercles. The abdomen with 5-6 (usually 6) pairs of lateral tubercles; segments 7 and 8 each with two sub-median dorsal tubercles or dark plates. Antennæ as long or slightly shorter than the body, especially in the early broods; 1st segment wider and a little longer than the 2nd; the 3rd the longest in the early broods, about as long as the 6th in the later broods; 4th longer than the 5th; 3rd to 6th markedly imbricated. Cornicles black, rather long, somewhat tapering towards the apex; in others almost cylindrical; imbricated; in certain stages they may be somewhat paler at the base. The 7th and 8th segments of the abdomen show, in some specimens, a darker plate which bears the papillæ. Legs pale grey to pale brownish green, apical half of meso- and meta-femora black, also the tibial tips and the tarsi. Antennæ dark brown, almost white at the base. Proboscis reaching to the 2nd pair of legs. Cauda small, dark.

Length—2 to 2.2 mm.

Nymph—Pink, reddish yellow or salmon colour, with fine white mealy covering. Eyes reddish black. Apex of cornicles and wing pads dark. Base of antennæ and legs paler.

Oviparous female.

Apterous, yellow, or lemon-yellow, to greyish or dull greenish yellow; head darkened. Antennæ nearly as long as the body; 1st segment longer and broader than the 2nd; 3rd longer than the 4th, not quite as long as the 6th; 4th a little longer than 5th, about half the 3rd; 6th a little longer than 4th and 5th; its basal area about half as long as the 5th; yellowish to pale greenish; the 5th and 6th segments smoky, markedly imbricated; sensorium on 5 and 6 normal. Eyes large. Cornicles straight, cylindrical, about as long, but thicker than the 4th antennal segment, pale yellowish to dusky yellow, except for the very dusky tip, imbricated and with one or two marked apical striæ. Fore and mid legs yellow or yellowish green, except the tarsi, which are dusky and the tips of femora and tibiae; hind legs with broadened tibiae, dusky, except at the base, with 45-50 sensoria over the whole surface; tarsi dark.

Proboscis yellow, brown at the tip, reaching to about the 3rd coxæ. Cauda small, pale, blunt, with two pairs of lateral hairs. On the body is a small lateral papilla between the mid and hind legs on each side.

Length—8 to 1 mm.

Male—Alate. Head and thorax dark, somewhat shiny. Abdomen small, dark in centre, with dark lateral spots, and dull reddish in places. Cauda and anal plate dark. Penis pale yellowish. Antennæ a little longer than body, deep blackish brown; 1st segment larger than 2nd; 3rd long, as long or longer than the 6th, with 45-50 sensoria; 4th longer than 5th, with 18-22 sensoria; 5th with 7-10 sensoria; 6th with flagellum about six times as long as the basal area, which is about one-third of the 5th. Eyes very large, dark. Proboscis rather thin and acuminate, reaching to the second legs; last two segments about equal. Cornicles black, cylindrical, rather narrow, imbricated, with some apical striæ. Legs with coxæ, most of femora, apex of tibiæ and the tarsi dark brown to black, rest dull yellowish green. Wings with brown veins.

Length—1.5 mm.

FOOD PLANTS.—All varieties of Apples and Pears, mostly on former in Britain; the Medlar; Walker records it from *Cratægus oxyacantha*, *Sorbus aucuparia* and *Sorbus domesticus*; Passerini on *Sorbus torminalis*. These latter records, I expect, all refer to the true *Aphis sorbi*.

DISTRIBUTION.—All over Britain, but especially in the Midlands, east, south and west; most parts of Europe, North America, Africa, and apparently in Australia.

LIFE-HISTORY IN BRITAIN.

This species hatches out in April, any time between the second week and the end of the month. It at first lives freely on the tops of the bursting buds and then enters them. As the buds open out, it continues to live freely on the young leaves and on the young and tender growth generally. To some extent the young foliage may shelter it. As the insect matures into the "Mother Queen," the leaf may either curl up and partially enclose her, or she may remain exposed beneath the leaf. This "mother-queen" soon produces living young, and often with great rapidity; and these, as

they grow, cause the leaf to curl right up and enclose them—the curled leaf frequently becoming a living mass of apteræ. By their constant sucking the foliage becomes more and more contorted, and eventually, both from the sucking of the insects and their excrement, which seems to have a scorching effect, the leaves turn brown, and may or may not fall off. Not only does this aphid feed on the leaves at the top of the shoots, but also on the shoots, and the result is contorted and stunted growth. The internodes are shortened, and consequently a very “stubby” appearance is produced, especially in young stock.

The first alatæ I have found occurred on June 13th, 1899, and I have found them onwards until 29th of July, in 1914. Although these Plant Lice become alate in masses, a few always occur some time before the main swarm, and others later. The winged females are very sluggish, and, like those of *Aphis rumicis*, collect together in masses, usually choosing the underside of a fairly large branch of the tree near its junction with the trunk. Many of these groups of alatæ were noticed in 1915 to die off and remain attached to the branches. This winged summer generation flies off in July, but where to I have been unable to trace. It dies out on the apple and pear from mid-July. In the beginning of September a few return migrants may appear, but the majority in October. These produce the sexual generation of apterous oviparous females and alate males. The sexuparæ may occur on into mid-November, and I have several times found the oviparous females in the first week in December. The females and males occur under the leaves, and, when fertilized, the females crawl to the shoots and lay their eggs either singly or in small groups; never in dense masses as is done by *Aphis pomi*. Many of the oviparous females fall to the ground with the ripe leaves before they have oviposited. These may lay their ova on the leaves as they lie upon the ground. The ova are at first yellowish, but soon become the normal shiny black.

I have vainly tried to trace this species to other plants this last six years. Weeds and their roots have been searched, to no avail. Recently, W. R. Ross writes me that he has found *sorbi* of the apple on the roots of *Plantago* in summer in Canada.

In one or two localities I have noticed that the attack of this

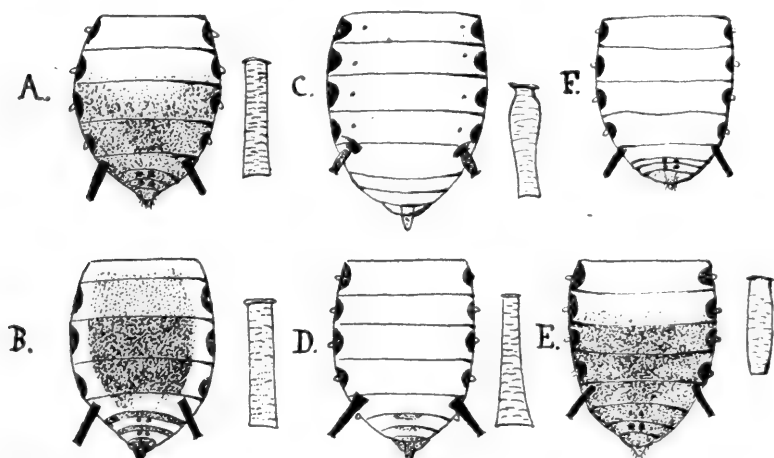


Fig. 4.—Bodies of Apple Aphides. A, *Aphis kochii* Schonteden (spring migrant). B, *A. kochii* Sch. (autumn migrant). C, *Siphocoryne avenae* Fabr. D, *Aphis pomi* De G. E, *A. crataegi* Kalténb. F, *A. kochii* (*sorbi* of Sanderson) spring migrant (after Sanderson).



Fig. 5.—Antennae of alate viviparous female Apple Aphides. A, *Aphis kochii* Schonteden, 13, V, '12 (spring migrant). B, *A. Kochii* Sch., 5, IX, '12 (return migrant). C, *A. pomi* De G., 17, VIII, '12. D, *A. crataegi* Kalténb. E, *Siphocoryne avenae* Fabr., 14, X, '15 (spring migrant). F, *S. avenae* Fabr., 7, IX, '15 (return migrant).

aphis is very marked, for the leaves become deformed in a blister-like manner, the damaged area being coloured a rosy or pallid yellow tint. This appearance, to some extent, resembles that caused by *Aphis crataegi* Kalt. I first noticed this in the Marden area in Kent in 1907, and in recent years in my own garden on an old Cyder Apple. Ants were found carrying the aphides down this large tree to some espaliers below, viz., Lord Suffield, Peasgood, Bramley Seedling and Cox's, but the effect caused by the aphides on them was quite normal. This shows that under certain conditions and on certain varieties the effect of this aphis varies. Walker records *A. sorbi* as appearing in thick clusters on *Sorbus domesticus* near London in 1847, giving the leaves autumnal red and yellow tints; this record again may refer to true *sorbi*. In some years in Britain *Aphis kochii* does enormous harm—perhaps 1915 has been the worst year of all. Many orchards were quite ruined by it, the foliage scorched, and in very many the fruit badly deformed by the punctures of the aphides, and consequently of no commercial value. In one plantation visited, which had been banded with Tanglefoot, but not sprayed, the insects swarmed all over the trunks and the bands were completely covered with thick layers of them. Some were found crawling up, others down the trees, all being apteræ or nymphæ. On July 4th this wandering ceased, and the majority commenced to become winged, many of the alatæ died on the trees, many others flew away.

Variation in colour.—I know of no aphid which varies so much in colour in the apterous stage. In one district they may all be slaty-grey, in another all bluish black, and locally called the "Blue Bug," in others most are plum colour or brown, but all have a small sprinkling of pale reddish or pink forms with them and called the Rosy Aphis; now and again this alone occurs. In some cases I have found colonies a dull brown, very similar to Koch's figure of his *Aphis pyri*.

NATURAL ENEMIES IN BRITAIN.

Towards the end of June a few *Coccinellidæ*, many Syrphid larvæ and now and then a Chrysopid larva may be found feeding on this insect. By the first week in July they become more abundant, and by the second week, as a rule, these "natural checks" seem to have obtained the ascendancy over the "Dolphins."

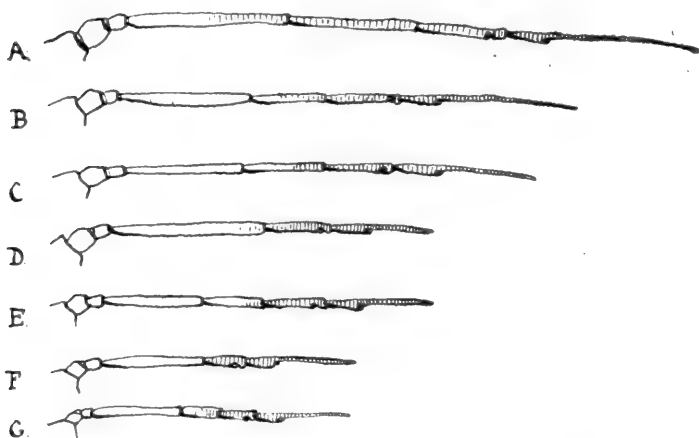


Fig. 6.—Antennæ of apterous viviparous female Apple Aphides. A, *Aphis kochii* Schonteden. B, *A. sorbi* Kaltenb. C, *A. pomi* De-G. D, *A. crataegi* Kaltenb. E, *A. oxyacanthæ* (= *nigra* nov. nom.) Koch. F and G, *Siphocoryne avenæ* Fabr., 1st and 2nd series.

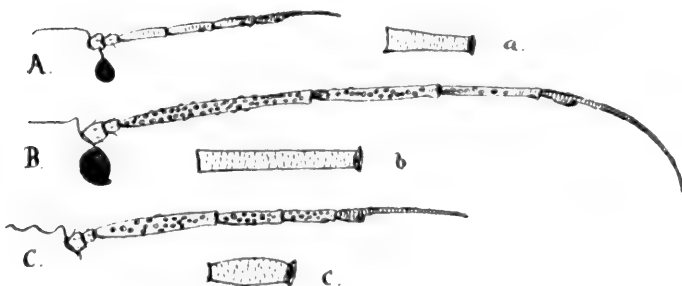


Fig. 7.—Males of Apple Aphides. A, Male *Aphis pomi*; a, cornicle. B, Male *A. kochii*; b, cornicle. C, Male *Siphocoryne avenæ*; c, cornicle.

By this time, however, all the damage has been done. Very few seem to be struck by Chalcid parasites, but I have bred one species on two occasions. The chief enemies are the *Adalia bipunctata* and *Coccinella septem-punctata*. The chief syrphids I have bred have been *Syrphus ribesii* and *Catabomba pyrastris*, but I have found several other larvæ feeding on them, including *Syrphus grossulariæ*. Spraying has little or no effect on this pest when once the leaves are curled. Nicotine-soft soap wash is the only one that shows any appreciable effect, and growers retain their nicotine for this purpose, but it is not nearly effectual enough to clean the trees, as so many lice are not hit owing to the dense leaf curling. Early spraying with nicotine and soap has, however, in many cases checked the damage. The best results I have seen have been with late lime spraying, just before the blossom opens. In small plantations and gardens stripping the curled leaves on bush trees has produced excellent results, and also autumnal spraying to kill the sexuales.

***Aphis crataegi* Kaltenbach (non Buckton).**

Kaltenbach, Mono. Pflanz., p. 66, 1843.

Tullgren, Upp. Prak. Ent. XVII, pp. 59 and 76, 1907.

Theobald, Entomologist XLIV, p. 403, 1911.

Theobald, Rept. Eco. Zool., 1911, p. 34, 1912.

Theobald, Entomologist XLVIII; No. 630, p. 259, 5, 1915.

Alate viviparous female.

Black and shiny, with a mealy snow-white band on the base of the abdomen, which varies from a narrow line to a broad band covering the first four segments, but usually only the first two; this band has a white meal orbit above and beneath. The colour to some extent varies; it may be pale yellowish white, pure white or pale pink, more rarely with an indistinct whitish green hue, and on this pale area are a few paired dusky marks or spots; five pairs of lateral black papillæ before the cornicles. The posterior of the abdomen may be a pale colour, with narrow transverse dark bars, and there are two sub-median papillæ behind; venter pinkish to pinkish white, and also to some extent mealy. Antennæ shorter than the body, black; the 3rd segment with 64-70 sensoria; 4th with 25 to 30 sensoria; 3rd thick and longer than the 4th; 4th about as long as the 5th. Eyes dark brown. Proboscis yellowish, apex black, reach-

ing nearly to or quite to the 3rd coxæ. Cornicles rather short, black to deep brown; imbricated, cylindrical, or slightly expanding at the base, a few constricted at the apex and base. Cauda black or brown, blunt, with two pairs of lateral hairs. Legs black, except the base of the femora, which are yellowish. Base of wings yellowish; stigma and veins greyish brown to brown.

Length—1.8 to 2 mm.

Apterous viviparous female.

Deep greyish green to almost black, with much mealy covering, and, when denuded of this, the insect is somewhat shiny. Antennæ

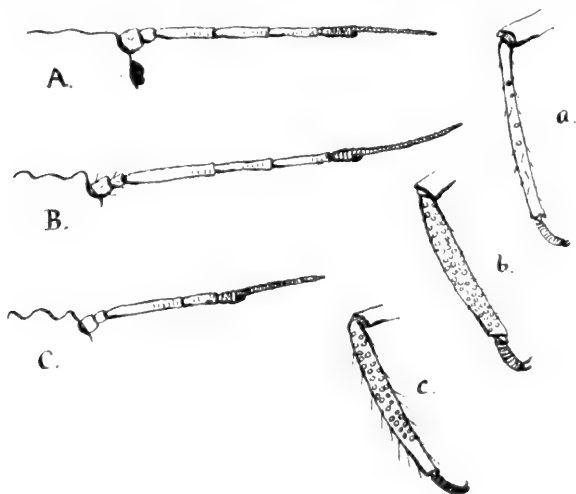


Fig. 8.—Oviparous females of Apple Aphides. A, *Aphis pomi*; a, hind tibia. B, *A. kochii*; b, hind tibia. C, *Siphocoryne avenæ*; c, hind tibia.

shorter than the body, base paler than the rest, composed in all the specimens I have seen of 5 segments only; the 3rd very long; the 4th less than half its length; the 5th with a short flagellum. Eyes deep brown to black. Proboscis greenish, apical half almost black, reaching to the second pair of legs. Venter deep greenish. Cauda black to brown. Cornicles short, black; in some the base is reddish yellow. Legs black.

Length—2 mm.

Nymph.—Two forms occur, one pale to deep green, mealy,

with dark legs and cornicles; the other fawn coloured and mealy, with dark wing-pads and eyes. Legs and cornicles dusky.

DISTRIBUTION.—Windermere, Cumberland, 23, V, 14 (Rymer Roberts). Marden, V, 07, and Wye, Kent, V, 10 (Theobald). Haddenham, Cambs, VI, 05 (Theobald), and Mortimer, Berks, V and VI, 11 (Lake).

FOOD PLANTS—*Pyrus malus*, *Pyrus communis* and *Cratægus oxyacantha*, etc.

OBSERVATIONS.—Described by Kaltenbach from Apple, Pear and Hawthorn. I have found it and received it from apple in England and often on hawthorn in Kent. It produces a very marked appearance, causing the leaves to become blistered. The blisters assume a rosy red to deep red hue; when on apple, yellow and red. The leaves curl downwards, and under those galled areas the insects live and reproduce. Sometimes the mid-rib region is galled; at others almost any part may be deformed; this is especially so on the hawthorn. It does not appear to be a commonly distributed species, anyway in the south and midlands. It was sent me from Mortimer in 1911, where Mr. Lake found it in abundance on Lane's Prince Albert apple. It is a very marked species, easily distinguished when alate by the white basal abdominal band when alive, and by this area being pale when the mealy covering is removed. The apteræ, in certain lights, appear quite black; in others a distinct grey-green, with dark legs, antennæ and a mealy coat. They are also flatter than the other dark species found on the apple (*nigra*, *rumicis*, etc.). Schonteden (Mem. Soc. Ent. Belg., XII, p. 226) places this species as a synonym of Boyer de Fonscolombe's *Aphis pyri*, which I cannot help thinking is incorrect.

Fonscolombe expressly states that the abdomen of the alate female is "Verdâtre, avec une bande brune un peu confuse de cheque côté; quelquefois presque tout brun; les tubercules latéraux sont verdâtres." The sexuparæ are not known.

Alatæ hatched from May 22nd to May 30th; they were very active. It is not known to what tree or plant they migrate. It is usually seen late in May and June, and continues to July. Buckton describes quite a distinct *Aphis* as Kaltenbach's *Aphis cratægi*, the apterous female being bright green and slightly mealy,

the alate female with bright green abdomen. I have already re-named Buckton's species *cratægiella* (Entomologist, XLIV, p. 4, 13, 1911). Passerini also describes an *Aphis cratægi* which is distinct, for he says it has "rusty red spots at the base of the cornicles."

Koch places Kaltenbach's *cratægi* as a synonym of Fons-colombe's *Aphis pyri*, but, as shown here, Koch's species is distinct.

(To be continued).

THEODORE PERGANDE.

News of the death of Theodore Pergande, which occurred on March 23, 1916, came as a shock to Canadian entomologists who have had the pleasure of meeting him and discussing questions relating to insect life. For a number of years, as we all know, his life had not been a very active one. During my last short stay in Washington I was unable to see Mr. Pergande, but I well remember my first visit to the Bureau of Entomology in 1901, when I frequently had the pleasure of meeting him and discussing matters of mutual interest. His liking for my late friend and associate, James Fletcher, was indeed genuine, and this undoubtedly opened the way for a more than passing interest in my visit.

From the Monthly Letter of the Bureau of Entomology, U. S. Department of Agriculture, for March, 1916, we learn that Pergande was born in Germany on December 28, 1840. He came to the United States at the time of the Civil War, and before very long entered the Northern army, serving throughout the war. Afterwards he secured a position as assistant to Prof. C. V. Riley, who at that time was State Entomologist to Missouri. When Riley was appointed Entomologist of the U. S. Department of Agriculture, in 1878, he took Pergande with him to Washington; and the latter for many years had direct charge of the rearing work, kept the notes, and made the great majority of the biological investigations upon which the entomological publications of the Department were based. Important results of his studies have been published as bulletins from the Bureau at Washington. His

publications, especially on the Aphididæ, are well known. "The Life-history of Two Species of Plant-lice inhabiting both the Witch-hazel and Birch," issued as Technical Bulletin No. 9, is a remarkable contribution, and one which took nearly twenty-two years of patient labour to complete. Two other important publications are "The Life-history of the Alder Blight Aphis," issued as Technical Bulletin No. 24, and the "North American Phylloxerinae Affecting Hicoria (Carya) and other Trees." This latter, published in Volume IX of the Proceedings of the Davenport Academy of Sciences, comprises pp. 185 to 273, accompanied by 21 plates. It is, indeed, a valuable contribution. The Entomological Society of Ontario occasionally received from Mr. Pergande short articles for publication in this journal.

The death of Mr. Pergande, who was the oldest assistant, in continuous service, in the Bureau of Entomology, Washington, D.C., took place after a brief illness of less than two weeks. The work he accomplished during his long engagement in the service of the United States Government will long be appreciated. We, in Canada, were indeed sorry to learn of his demise.

ARTHUR GIBSON.

NOTES AND QUERIES.

INHABITANTS ON AN APRIL MUD PUDDLE.

On the afternoon of April first I determined to start out on the initial 1916 collecting trip in spite of the ice on the pond nearby and the still lingering snowdrifts in the woods.

Wading along in the open water, at the edge of the pond, I started out a few *Peltodytes* (*Cnemidotus*) and *Hydroporus*, and discovered a couple of *Matus bicarinatus* on the under side of a board. Passing on up the hill, after investigating a shallow pool at the foot without success, through the oak scrub to an abandoned gravel pit, I came upon a small puddle of water about two inches deep and six feet square. After stirring this up and taking a few *Hydrobius fuscipes* and one *Hydroporus tristis*, I proceeded to tread the few inches of soft earth into a mass of mud and water, with the following surprising results, which came floating to the

surface of the mixture: One *Tachys lævus* Say, seven *Tachys granarius* Dej., one *Amara cupreolata* Putz., two *Agonoderus testaceus* Dej., many *Stenolophus conjunctus* Say, several *Helophorus lineatus* Say, one *Ilybius biguttatus* Germ., one *Phelister subrotundus* Say, three *Cytilus (sericeus) alternatus* Say, two *Heterocerus brunneus* Melsh., one *Atænius imbricatus* Melsh. (my first record for this), four *Aphonus castaneus* Melsh., two *Graphops curtipennis* Melsh., one *Graphops marcassita* Cr., twelve *Dyschirius* sp., seven *Aleocharinæ* sp., one *Aleocharinæ* sp., two *Stenus* sp., two other *Staphylinidæ* sp., two species of ants, several spiders, two plush-covered caterpillars, two larvæ, one chrysalis, and one small Dipteron that appeared at home on the surface of the water.

The only vegetation here was some moss or lichens and a few spears of grass. Several much more favourable looking places failed to yield a single specimen other than *Hydrobius fuscipes*.

The catch numbered 60 odd specimens of 21 species representing 19 genera and 9 families of the Coleoptera alone.

C. A. FROST,
Framingham, Mass.

APHIDS ON CALIFORNIA PRIVET IN NEW JERSEY.

As a rule, California privet (*Ligustrum ovalifolium*) enjoys unusual freedom from insect attacks in New Jersey, even though it becomes infested with *Aleyrodes citri* Riley & Howard in the southern states and the San José scale in California. In New Jersey white grubs (*Lachnosterna* sp.) have been found injuring the roots, and occasionally a stray San José scale is discovered, but on July 15, 1915, a privet hedge in Jersey City was found to be infested by plant lice. The upper surfaces of the leaves were characteristically discoloured, some being quite yellow and the foliage of the infested plants had a peculiar limp appearance instead of being twisted and curled. Specimens were sent to Prof. C. P. Gillette and determined by Mr. L. C. Bragg as *Rhopalosiphum ligustri* Kalt. They also stated that they believed this to be the first record of the occurrence of this species in the United States.

HARRY B. WEISS,
New Brunswick, N. J.

ODONATA AND EPHEMERIDÆ.

Contributions to Canadian Biology, being studies from the Biological Stations of Canada, 1911-1914, Fasciculus II—Fresh Water Fish and Lake Biology. Supplement to the 47th Annual Report of the Department of Marine and Fisheries; Fisheries Branch. Ottawa, 1915.

In this "Blue book," issued by the Dominion Government, there is a series of thirteen important papers dealing with the aquatic fauna and flora of the eastern coast of the Georgian Bay in Ontario. They are published in this way in order to extend the knowledge respecting the available food for fishes in these waters, their parasitic enemies and other matters of biologic interest. Three papers deal with aquatic insects. The first is by Dr. E. M. Walker on "The Odonata of the vicinity of Go Home Bay," in which he records his observations on the Dragon and Damsel flies to be found in the neighbourhood of the Biological Station, with descriptive notes on more than sixty species. The article is illustrated with two plates of structural details, five views of the characteristic scenery, and a plan showing the seasonal distribution of the species—the whole forming a most valuable contribution to the knowledge of the life-histories of these attractive insects.

The other papers of an entomological character are by Mr. W. A. Clemens of the University of Toronto, and are entitled, "Rearing Experiments and Ecology of Georgian Bay Ephemeridæ" and "Life-histories of Georgian Bay Ephemeridæ: observations on Heptagenia and breeding experiments." In the former paper twenty species are referred to and many of them described; and in the latter, which deals only with a single but largely represented genus of May-flies, there is given a key to the imagos and descriptions of the nymphs and their life-histories. Six plates of nymphs and details of structure add much to the value of the papers. These insects, which are often to be found in enormous numbers, supply a very important part of the food of many fishes.

C. J. S. B.

The Canadian Entomologist.

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No. 7

POPULAR AND PRACTICAL ENTOMOLOGY.

A FEW DAYS IN NEWFOUNDLAND.

BY E. M. WALKER, TORONTO.

In the summer of 1914 I had the opportunity of spending a few days in Newfoundland, which I had long wished to do, for I had heard enough about its beauty and the peculiarities of its fauna and flora to arouse within me a strong desire to see some of these things for myself.

Unfortunately I had but five days to spend on the island and two of these were cold and wet, so that the chief result of my trip was a greatly increased desire to go there again.

My main object was to collect and observe the dragonflies, particularly of the genus *Somatochlora*, the species of which are nearly all inhabitants of the far north, and are consequently less known than those of any other North American genus of the order Odonata. A collection of dragonflies made by Dr. D. A. Atkinson at the Bay of Islands and Grand Lake, Nfd., and recorded by Mr. E. B. Williamson (*Ent. News*, XVII, 1906, pp. 133-139) was so rich in species of this genus that I had little doubt that I could obtain a good series of them even in a few days. So I planned to go at once to the Bay of Islands and spend there the few days that I had at my disposal.

Leaving North Sydney on the night of June 24th, I arrived at five o'clock on the following morning at Port aux Basques on the southwestern corner of Newfoundland, and immediately boarded the train which was to take me to my destination, Humbermouth, on the Bay of Islands, about 120 miles up the west coast. (I might almost have said "embarked" on this train, for the trip was more like a rough sea voyage than a railway journey.)

Port aux Basques is a quaint little fishing village, and I longed to spend a day there, but could not afford the time. The low, rounded, treeless hills, enveloped in mist, the stunted vegetation

and great stretches of moors had a semi-arctic aspect suggestive of the tundra or barren-grounds of the far north, and I have no doubt they would prove of great interest to the entomologist. Though treeless, patches of dwarfed spruce, not more than two or three feet high, occupied the more sheltered slopes, and these became more frequent and of gradually increasing height as the train drew away from the coast.

In a very short time groups of stunted, gnarled trees began to appear, most of them so windblown and fantastically shaped as to be scarcely recognizable. They were mostly spruce, tamarack and balsam poplar. I noticed here and elsewhere that the tamarack has apparently never been attacked by the larch saw-fly (*Nematus erichsonii*), which has probably devastated the entire area occupied by this tree on the continent, and it is to be hoped that Newfoundland, at least, will be spared the ravages of this destructive pest.

The greater part of the country through which we passed on the way to the Humbermouth consists of vast swamps and bogs, sometimes densely wooded with black spruce, but in the wetter parts supporting only a scattered growth of stunted trees of this species and of tamarack. Here and there we had glimpses of beautiful bog flowers, and at one spot where the train stopped one could have gathered bunches of that magnificent orchid, the Showy Lady's Slipper (*Cypripedium reginæ*), close to the railway track. The vegetation along the railway was in some places extremely rank, one of the commonest plants being the cow-parsnip (*Heraclium lanatum*), which, though a tall stout plant with us in Ontario, is far larger in Newfoundland, the usual height being seven or eight feet. It is likewise far more abundant, and, in fact, is regarded there as a troublesome weed.

On account of the boggy character of this country, very little of it has been cultivated, although, when properly drained and treated with lime, it produces a fine growth of timothy and other crops.

The monotony of these bogs is frequently relieved by hills, magnificent ravines and gorges in which the vegetation is sometimes so rank and vigorous as to recall British Columbia. These

ravines are well timbered with tall white spruce, balsam-fir, yellow and white birch and balsam poplar, with occasional specimens of our familiar white pine, and the dense undergrowth, a luxuriant tangle of shrubs, ferns and flowering plants, makes a most alluring sight to an entomologist. In all of these ravines there are clear rushing streams, many of them no doubt teeming with salmon and speckled trout.

During the course of the trip I had the usual tantalizing experience of passing innumerable ideal-looking spots for dragonflies; ponds, pools, and lakes of all sizes, some dark and bog-margined, others shallow and reedy, all of them inviting.

Humbermouth, my destination, was reached about 3.30 p.m. and, from a picturesque standpoint, no finer spot could have been selected as the terminus of my trip. The broad Bay of Islands, surrounded by majestic wooded hills and the clear rushing waters of the beautiful Humber, just beyond the village, were thrilling in their peaceful grandeur; but I soon determined from the topography of the country that this was no place for dragonflies, so on the following day, which was cold and wet, I again took the train southward and got out at Spruce Brook, which I had noted on the way as a promising locality.

Spruce Brook is a famous resort for salmon fishing, and the Log-cabin Hotel is one of the most delightful places I have ever visited. In such a remote spot I was not prepared for the modern conveniences which I found there, and the kindly interest and courtesies shown me by the proprietors, Messrs. Whittington and Dodd, were of material assistance in enabling me to make the most of the few days I spent there.

The Log-cabin Hotel is situated on the shore of a beautiful lake in a broad valley, flanked by low wooded hills. The land in front of the hotel is largely cleared and partly cultivated, but on all sides there are rich woods, with streams, marshes and ponds within easy reach. The flora is very luxuriant and apparently abundant in species, so that the entomological outlook seemed full of promise. In this, however, I was doomed to disappointment.

I lost no time in looking up a promising place for dragonflies. I was directed to a small pond, nearby, with a marshy shore and connected with Spruce Brook itself. The weather was dull and

wet, and it was getting late, so that I was not discouraged in finding only a few specimens of *Cænagrion resolutum*, a little pale blue damsel-fly, which is widely distributed across Canada and already known from Newfoundland. I also took from the creek a single nymph of a *Lestes*, apparently *unguiculatus*, and one of *Æshna umbrosa*, neither of which had been previously reported from the island.

On the following day I found a small lake, a mere expansion of a trout stream, the upper end of which was bordered by an open marsh covered with short sedges and similar marsh plants. It looked favourable, but dragonflies were exceedingly few, *C. resolutum* being the only species that could be called common. *Enallagma calverti*, another blue damsel-fly of wide distribution in the north, was taken in small numbers, and I also got two specimens of *Somatochlora albicincta*, the first of the genus which formed the chief objective of my trip. The most interesting find, however, was another little *Cænagrion*, of which I had taken a pair the preceding year at Nipigon, Ont., and which proved to be the *Agrion interrogatum* of Selys, previously known only by a single imperfect female from Saskatchewan, described in a Belgian journal 40 years ago. (See Can. Ent., XLVII, 1915, pp. 174-181). I searched here for more specimens of this rarity on this and the following day, but succeeded in getting only two more specimens. Along the wood road leading to this lake from the railway a few large dragonflies of the genus *Æshna* were occasionally seen, but they were so few that I considered myself lucky to have captured one of them. It was *Æshna interrupta* E. Walk., another species of transcontinental range.

This lumber road was a good general collecting ground, but collecting was difficult owing to the swarms of black flies (*Simulium venustum* ?), "punkies" or sand-flies (*Culicoides* sp.) mosquitoes and deer-flies (*Chrysops*). I collected a few of the latter which were kindly determined for me by Mr. M. C. Van Duzee, and I was surprised to learn that five species were represented among them, viz., *C. marens* Wlk., *C. frigidus* O. S., *C. celer*, O. S., *C. excitans* Wlk., and *C. mitis* O. S. The only other Tabanid I noticed was the common *Tabanus affinis*, of which I took but one specimen.

On the afternoon of my third day at Spruce Brook I determined

to visit a certain marsh at the far end of a lake about half a mile long, which lies between densely wooded hills not far from the hotel. In order to reach it I had to struggle through a dense black spruce swamp extending the entire length of the lake. Now a black spruce swamp is always enticing to me, but on this occasion I had had enough of it by the time I reached the marsh, without the return trip, and the worst of it was that when I did arrive there no dragon-flies were to be seen, except a very few of *C. resolutum* and *E. calverti*.

It was here though, and at the other marsh, that I found the sole representatives of the Order Orthoptera which I came across in Newfoundland. These were a very few young nymphs of *Chorthippus curtipennis* Harr., one of the most common and widespread of Canadian grasshoppers. The season was certainly very backward, but, in spite of this, one would have expected to find at least the nymphs of the commoner grasshoppers in the fields and clearings. I searched for these in vain, however. Morgan Hebard has recently published a list of six species of Orthoptera from Newfoundland (Ent. News, XXV, p. 306, 1915), two of which (*C. curtipennis* and *Melanoplus fasciatus*) were already known to occur there, and my colleague, Dr. A. G. Huntsman, brought me three species from the Bay of Islands, taken in 1915, and all included in Mr. Hebard's list. Our commonest field grasshoppers, *Melanoplus femur-rubrum* and *M. atlantis*, are unknown in the island, and it is quite probable that they do not occur there. No crickets have been taken and only one long-horned grasshopper or "stone-cricket," *Ceuthophilus terrestris* Scudd. The absence of these common and widespread insects is interesting, but it is only part of a general condition characteristic of this island, of which I shall have more to say later.

(TO BE CONTINUED).

SOME NEW RACES AND SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, F.I.D.

DIURNALS

***Basilarchia arthemis rubrofasciata*, subsp. nov.**

A series before us of 6 ♂'s and 1 ♀ from Northwestern Canada shows certain constant points which we think warrants
July, 1916

the bestowal of a racial name. In typical *arthemis*, which we might point out was described from New York (probably vicinity of New York City), the submarginal band on underside of secondaries consists of a series of red spots, separated from the marginal green lunules by a well defined black area; in this new race this submarginal area is occupied by a continuous reddish band extending completely up to the green lunules and only separated from the interior white band by a narrow line of black; the basal area is also largely suffused with reddish, making the three red spots near base of wing much less distinct than in the typical form. On the upper side the ground colour is a dead black and the red submarginal spots of secondaries are large and with scarcely a trace of green edging on their inner side. It is this form that is figured by Say from Lake Winnipeg, which is apparently about the eastern limit of the race.

Types—One ♂, Saskatchewan (Croker); five ♂'s, Cartwright, Man.; one ♀, Calgary, Alta. (Dod) in Coll. Barnes.

***Junonia coenia nigrosuffusa*, subsp. nov.**

The smoky-black Arizona form of *cœnia* has been generally and wrongly listed as *negra* Feld., which was described from specimens taken on the Rio Negro in Northwestern Brazil and which is evidently a form of the S. American *lavinia* Cram., distinguished by its metallic green shaded secondaries. We propose the above name for the Arizona race, which has in general the maculation of typical *cœnia*, but the whole upper surface suffused with black-brown, rendering the white subapical banding very obscure; the eye spots of the secondaries are often considerably reduced in size as compared with those of the northern *cœnia*.

Types—Three ♂'s, Palmerlee, Ariz.; two ♂'s, Babaquivera Mts., Ariz.; one ♂, Huachuca Mts., Ariz.; one ♀, Arizona, in Coll. Barnes.

***Brenthis aphirape dawsoni*, subsp. nov.**

Specimens from Hymers, Ont., show several points of difference from Labrador specimens (typical *triclaria* Hbn.). The upper side has a deeper brown colour, with a strong suffusion of black, especially along the outer margin, where the brown lunules are

almost entirely effaced; the submarginal row of black spots is very large and there is a tendency for these spots to lengthen out and touch the marginal black area; they are preceded by a well defined black suffusion, which is usually very faint in *Labrador triclaris*. On the underside the median band of secondaries is strongly silvered and stands out prominently against the leathery-brown background, which is slightly deeper in tone than that of *Labrador* specimens. We take pleasure in naming the race after Mr. Horace Dawson, who by his conscientious collecting has greatly added to our knowledge of the lepidopterous fauna of Northwestern Ontario.

Types—A long series of ♂'s and ♀'s from Hymers, Ont. (June 15-30) in Coll. Barnes.

***Brenthis chariclea grandis*, subsp. nov.**

This form from Hymers, Ont., bears the same relation to *chariclea boisduvali* Dup. from Labrador that *aphirape dawsoni* does to *triclalis* Hbn. It is considerably larger than typical *boisduvali*, the ♂'s averaging 40 mm. wing expanse as compared with 35 mm. in the latter form; the black marginal border is heavier and the submarginal black spots larger with a tendency to become elongate and join the marginal band. On the underside the apex of primaries is heavily and broadly suffused with deep purple, with scattered yellowish markings, and on the secondaries the area beyond the median band of spots is almost entirely of the same deep rich purple colour, with at most only traces along the veins of the paler yellowish shading found in *boisduvali*.

Types—A long series of ♂'s and ♀'s from Hymers, Ont. (Aug. 1-15, Dawson) in Coll. Barnes.

***Lycæna rita*, sp. nov.**

♂.—Upper side brilliant violet-blue, with a narrow black border to both wings about 1 mm. wide, that of the secondaries tending to break up more or less into isolated spots shaded slightly with orange internally near the anal angle; fringe white, faintly checkered with black. Beneath creamy white, with a distinct black marginal line to both wings and checkered fringes;

primaries with a rather faint marginal row of oblong spots, reaching neither the costa nor the inner angle, followed by a row of six large black spots almost joined to form a continuous band; the usual postmedian row of spots large, black, much excurved opposite the cell, and almost touching the submarginal row; a broad black dash in the cell and a series of three small subbasal spots. Secondaries with a marginal row of six black spots and a submarginal row of black dashes of which the two costal ones are heavy and round, the remainder being reduced and rather lunular in shape; between these two rows of spots a broad orange band fills the entire space from anal angle to vein 6; a bent postmedian row of prominent round black spots and a subbasal row of four similar spots with a black discal dash.

♀.—Pale brown above, with a broad orange band on secondaries, much as on the underside, and a more or less distinct row of marginal round spots; occasionally the inner margin of this band shows traces of blue scaling, which may also be found at base of primaries; underside as in the ♂.

Expanse 23 mm.

Types—Three ♂'s, S. Arizona (Poling); one ♂, Santa Rita Mts., Ariz.; one ♂, Rio Verdi Mts., Ariz.; three ♀'s, S. Arizona (Poling) in Coll. Barnes.

The species is closely allied to *enoptes* Bdv., but differs in the whiter ground colour of underside with broader orange band; the spots are also rather heavier and the blue of the upper side more violet in shade; the ♂ genitalia, while quite distinct, show a relationship to *enoptes* rather than to *battoides* Behr., which has totally different sexual organs. We expect to make a few notes at a later date on these much confused species, together with figures to illustrate the points of distinction.

HEMILEUCIDÆ.

Hemileuca lucina latifascia, subsp. nov.

Specimens from Manitoba, while agreeing with typical *lucina* from the New England States in the transparent appearance of the wings, have the pale banding very much broader, especially on the primaries, leaving only a narrow black border of equal width

on both wings and much as in *nevadensis* Stretch; from this latter species, apart from their more transparent appearance, they may at once be distinguished by the thoracic vestiture, which is black, not pale yellow, as is found in *nevadensis*. The discal spot of secondaries in the Manitoba race is generally shorter and shows much more tendency to obsolescence than in either *lucina* or *nevadensis*.

Types—Five ♂'s, one ♀, Aweme, Man. (Criddle) (Sept.) in Coll. Barnes.

NOCTUIDÆ.

***Ipimorpha viridipallida*, sp. nov.**

Primaries pale greenish ochre, with the usual markings of the genus, consisting of an outwardly oblique white t. a. line, slightly bent inwards in the central portion, an almost straight t. p. line, slightly angled opposite the cell, a faint and strongly irregular s. t. line defined inwardly by greenish shading, a large round orbicular outlined in white and a similarly outlined upright reniform constricted in the middle; claviform very faintly outlined and appressed to the t. a. line. Secondaries almost pure white, with a faint dark curved postmedian line crossing the central area of the wing. Beneath whitish, with a faint postmedian line crossing both wings.

Expanse 35 mm.

Types—Six ♂'s, two ♀'s, Truckee, Calif. in Coll. Barnes.

Most closely related to *nanaimo* Barnes, with practically identical markings; the pale greenish colour of primaries and the white secondaries readily separate it, however, from this species.

***Abrostola parvula*, sp. nov.**

• Thorax gray and brown mixed, posterior tufts light brown. Primaries with basal area to t. a. line brown, shaded with whitish at extreme base; t. p. line geminate, inner line faint, outer sharp, black, slightly angled below costa, rather evenly rounded to vein 1, where it bends outward, forming a slight but noticeable angle; median area dark blackish brown, containing the pale orbicular, subreniform and reniform spots the former two placed obliquely

to each other and joined, forming a figure eight; all the spots with more or less central brown shading, but with no very definite defining lines, t. p. line diffuse, whitish in costal half, geminate and incurved in lower half, the inner line being very distinct and dark brown; three or four black interspaceal dashes below the apex of wing and a white sharply dentate but broken s. t. line preceded by a diffuse narrow brown shade, the apices of the dentations almost touching the outer margin and tipped with brown; fringes slightly checkered by pale dots at ends of veins. Secondaries smoky, paler in basal half in the ♂ with a faint dark median curved line. Beneath smoky, secondaries paler, both wings with discal dot and dark postmedian line.

Expanse 24 mm.

Types—One ♂, S. Ariz. (Poling) one ♀, Redington, Ariz. in Coll. Barnes.

Allied to *urentis* Gn., but considerably smaller. We have other specimens apparently similar to the type from Kerrville, Tex., and Shovel Mt., Texas, which may, however, prove to be a distinct race when more material is available for examination.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. W. WOLLEY DOD, MIDNAPORE, ALTA.

(Continued from Page 167).

HETEROCERA.

SPHINGIDÆ.

Hemaris diffinis Bdv. var. *ariadne* B. & McD.

Hemaris thysbe Fabr. One had the fore part of the abdomen green, though in most of the specimens it was yellow. Some with dentate inner edge to the marginal band were separated as var. *cyliceformis*. All these forms grade easily through to one another.

Deilephila gallii Rott.

Deilephila lineata Fabr.

Ampelophaga chærilus Cram.

Sphinx drupiferarum S. & A.

Sphinx gordius Cram. One specimen.

Sphinx vancouverensis Hy. Edw. and var. *albescens* Teffer.

Sphinx chersis Hbn. One specimen.

Marumba modesta Harr.

Smerinthus jamaicensis Dru. and var. *geminatus* Say. A single specimen in the series was of the typical form *jamaicensis* with the round pupil to the ocellus.

Smerinthus cerysi Kirby.

Paonias excæcatus S. & A.

Paonias myops S & A..

Cressonia juglandis S. & A.

SATURNIIDÆ.

Samia columbia Sm. var. *nokomis* Brodie.

Telea polyphemus Cram.

CERATOCAMPIDÆ.

Anisota virginiensis Dru.

SYNTOMIDÆ.

Scepsis fulvicollis Hbn.

Ctenucha virginica Carp. One specimen.

LITHOSIIDÆ.

Crambidia casta Sanb.

Lexis bicolor Grt.

Hypoprepia miniata Kirby.

Hypoprepia fuscata Hbn. and var. *plumbea* Hy. Edw. This variety is distinguished by a wide border on secondaries.

Clemensia albata Pack.

NOLIDÆ.

Celama cilicoides Grt.

Nola sp. near *ovilla* Grt. Two specimens. One of these was submitted to Messrs. Barnes and McDunnough, who were unable to give it an exact name, but stated that it was nearest *ovilla*.

ARCTIIDÆ.

Eubaphe immaculata Reak.

Eubaphe spp. Probably *rubicundaria* Hbn. and *quinaria* Grt.

Haploa lecontei Bdv. and vars. *militaris* Harr. and *vestalis* Pack.

Haploa confusa Lyman.
Estigmene acræa Dru.
Estigmene prima Slosson.
Estigmene congrua Walk.
Hyphantria textor Harr.
Diacrisia virginica Fabr.
Isia isabella S. & A.
Phragmatobia fuliginosa Linn.
Phragmatobia assimilans Walk.
Hyphoraia parthenos Harr.
Apantesis virgo Linn.
Apantesis virguncula Kirby.
Apantesis parthenice Kirby.
Apantesis oithona Strk. var. *rectilinea* Kirby.
Apantesis williamsi Dodge, var. *determinata* Neum.
Ammalo tenera Hbn.
Euchætias oregonensis Stretch.
Halisidota tessellaris S. & A.
Halisidota maculata Harr.

AGARISTIDÆ.

Alypia langtonii Coupes. Males of this species stood separately as *octomaculata* Fabr. This error has been a very general one in collections throughout Canada, Lyman going to the extent of publishing an erroneous correction of Holland's figures. In the male sex, *langtonii* and *octomaculata* resemble one another very closely indeed, and both have two white spots on the secondaries, whereas *langtonii* ♀ has only one.

NOCTUIDÆ.

Charadra deridens Grt.
Raphia frater Grt.
Acronycta americana Harr. Females stood correctly, males of the same species standing as *hastulifera*.
Acronycta dactylina Grt.
Acronycta cretata Sm. stood as *leporina*.
Acronycta innotata. The whitest specimens of this stood as *cretata*, whilst some ochreous tinted specimens stood correctly as *innotata*. I thought at first that these latter might be *betulæ* Riley,

but subsequent investigation showed that I was wrong. I have not, so far, seen *betulae* from western Canada.

Acronycta interrupta Gn. A single worn female.

Acronycta marula G. & R.

Acronycta lobeliae Gn. Two specimens.

Acronycta manitoba Sm. A series stood correctly named Others stood under *hasta* Gn, whilst three rather large, but otherwise similar, specimens were separated as *telum* Gn. I attached the label to one of these specimens as evidence of what Smith claimed to have at last identified from Manitoba is "the true *telum* of Guenée."

Acronycta radcliffei Harv. Two specimens correctly, and a third rather small one, as "? *tartarea* Sm."

Acronycta quadrata Grt.

Acronycta spinigera Gn. A single female, dated June 23rd, 1910.

Acronycta superans Gn.

Acronycta funeralis Grt. A female, June 27th, 1912.

Acronycta fragilis Gn.

Acronycta grisea Walk.

Acronycta falcula Grt.

Acronycta albarufa Grt.

Acronycta hesitata Grt. One specimen.

Acronycta inclara Sm. Smith admitted that the aggregate of specimens to which he first gave the name *inclara* (viz., the *hamamelis* of the Monograph) contained a mixture of species. He had made no type, but ultimately fixed Hampson's figure under *inclara* as representing the type of the species.* Unfortunately the figure is a poor one, but I have carefully compared it with specimens in the British Museum, and have not the least doubt as to the species represented. It appears to be fairly common in Manitoba. The Heath collection contained a long and variable series, of which some stood as *inclara*; others as *hamamelis*, and a few small specimens as *modica* Walk.

Acronycta impleta Walk. var. *illita* Smith.

Acronycta sperata Grt. I could see no justification whatever for the attempted separation of the "supposed new species very

*Ent. News, XXII, 309-318, July, 1911.

near *sperata*," which Smith claimed to have discovered from Cartwright, and which was recorded by Heath in his published notes.

Acronycta noctivaga Grt.

Acronycta impressa Walk.

Acronycta obliterata S. & A.

Arsilonche henrici Grt. The North American representative of European *albovenosa*.

Microcalia diptheroides Gn.

Bryophila lepidula Grt. var. *avirida* Smith. Most were the true dull coloured *avirida*, but they graded through to a form nearly as pale, though not quite as bright, as typical *lepidula*.

Bryophila teratophora H. S.

Moma geminata Sm. One of the specimens had a narrow, dark, smoky transverse band, not previously observed in the species.

Chytonix palliatricula Gn. and var. *iaspis* Gn.

Baileya dormitans Gn.

Hadenella tonsa Grt.

Catabena lineolata Walk. One specimen, May 25th, 1911.

Platysenta videns Gn. Amongst this series stood one *Himella contrahens* and one *Orthosia inops*.

Senta defecta Grt.

Balsa malana Fitch.

Athetis (*Caradrina*) *extima* Walk.

Proscenus (*Caradrina*) *miranda* Grt.

Hypocæna (*Caradrina*) *rufostriga* Pack.

Oligia festivooides Gn.

Hillia iris Zett (*orasis* H. S.) A single specimen was of the red-brown var. *vigilans* Grt., and the rest of the ochreous grey form known as *senescens* Grt.

Hillia algens Grt. A series stood correctly, and another series stood elsewhere as *Cleoceris curvifascia* Sm.

Hillia dircinigra Walk.

Protagrotis (Luperina) niveivenosa Grt. This species, which has occasionally, but by no means always, a spine on hind tibia, is identical with *viralis* Grt. The fact was not known to Sir George Hampson when he published a *viralis*.

Luperina flavistriga Sn. One female, Aug. 1st, 1911.

Luperina stipata Morr.

Luperina passer Gn. There was also a male, dated July 25th, 1911, of a pale grounded, black shaded form of which I have seen specimens from all the way from Montreal to Vancouver Island. I have tried to prove this a distinct species, but so far unsuccessfully. The genitalia in no wise differ from those of normal *passer*.

Hadena indocilis Walk. and vars. *runata* Smith and *enigra* Smith. *Indocilis* is the form standing in our lists as *remissa* Hbn. After much attention to the subject, I have decided that *runata* Smith and *enigra* Smith are in all probability variations of the same species. *Ferens* Smith is an exact synonym of *runata*, and *enigra* is exactly like some of my British specimens of *gemina* Hbn., of which *remissa* Hbn. is a European var. corresponding to our *indocilis*. *Separans* Grt. and *lona* Strk. are probably the same species as *indocilis*, in which case *lona* refers to a form similar to *enigra*. The male genitalia of all the above-named forms, so far as I have yet examined them, both British and North American, are alike. This is about the most variable of our *Hadenas*. The Heath collection contained a single female only of the var. *enigra*, lacking abdomen, but otherwise in splendid condition, and dated June 26th, 1905. It stood in the series with *miniota*, to which it bears a very close resemblance.

Hadena alia Gn. and var. *rorulenta* Sm.

Hadena vultuosa Grt.

Hadena cerivana Sm. There was one very peculiar aberration which I associate here, though it differed widely from anything previously seen.

Hadena lateritia Hfn.

Hadena dubitans Walk. The black form.

Hadena plutonia Grt. About a third of the specimens so standing were this species, one was *dubitans*, and the rest *Helotropha reniformis*.

Hadena devastatrix Brace. A few of this species stood under their correct name, but a number far greater did duty for *versuta* Smith.

Hadena arctica Bdn.

Hadena occidens Grt., mixed in the series with *arctica*.

Hadena miniota Sm. A few specimens, including two female co-types. I have elsewhere expressed my conviction that *miniota* was a bronze-coloured form of *versuta*, but recent examination of the genitalia of a large number of colour forms of Calgary males has disclosed strong evidence of the existence of two species, not always separable on superficial characters. One unfortunate result of this discovery is that the exact identity of *versuta* must at present remain in doubt. It is quite probable that older names properly belong to both species.

Hadena cariosa Gn. Two specimens.

Hadena commoda Walk. (syn. *alberta* Sm.) Only two specimens stood under their correct name, but numerous others were found mixed with other species. Four specimens stood as *cogitata* Sm. as well as one small specimen of *lateritia*, in truth most surprisingly like *commoda*.

Hadena lignicolor Gn.

Hadena inordinata Morr. One specimen, standing as *semilunata* Grt., the distinctness of which is doubtful.

Hadena mactata Sm., including the grey form *allecto* Sm. A female specimen of a probable variation of this species stood, quite wrongly, under *adnixa* Grt.

Hadena modica Gn.

Hadena semicana Walk. (syn. *hausta* Grt.) One specimen, mixed in the series with *exhausta* Sm. Standing as *semicana* was a single badly worn specimen of *Parastichtis discivaria* Walk. Smith always had an entirely wrong conception of *semicana*, and used to give this name to pale specimens of *fractilinea*, from which it is widely distinct.

Hadena exhausta Sm. A series of very poor specimens.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN
AND THE
DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY FRED V. THEOBALD, M.A.

(Continued from Page 213).

Aphis (Myzus) nigra, nov. nom.

Aphis oxyacanthæ Koch (non Schrank).

Myzus oxyacanthæ Schonteden.

Koch, Die Pflanzen, p. 55, figs. 70, 71, 1857.

Schonteden, Les Aphid. Palæarct., p. 173 (190?).

Theobald, Entomologist, XLIV, p. 404, 1911.

This aphid was found by Koch and described from specimens on *Pyrus pyraaster* during May.

It has so far been found in Britain in two localities; once at Mortimer, Berkshire, on apple trees (12, VI, 1911) and at Wye on apples (2 and 20, VI, 1911) and on Hawthorn (6, VII, 1907).

From notes sent me, it appeared to have been abundant on apple trees at Mortimer, with *A. crataegi*, but later at Wye in the same year I found it in several large colonies on apples, living under the leaves of some Worcester Pearmain and a Peasgood Nonsuch, and previously in the same locality on Hawthorn hedges. I have only seen apterous females, but Koch describes and figures the alate viviparous female.

Apterous viviparous female:

Black and shiny; antennæ black; not half the length of the body, of six segments; the 1st wider than the 2nd, scarcely longer; the 3rd nearly as long as the 6th, 4th and 5th about equal, basal area of the 6th nearly half as long as the flagellum; the last two segments and most of the 4th markedly imbricated. The legs may be all black, but now and then the tibiæ seem to be paler on their basal two-thirds.

Alate viviparous female:

Described by Koch as being all black, except the tibiæ, which are yellowish, except at their apices. There are four pairs of lateral

July, 1916

abdominal papillæ before the cornicles. Antennæ black and shorter than the body. Cornicles rather short, black. Cauda black, prominent.

***Aphis rumicis*, Linnaeus.**

Aphis papaveris Fabricius.

Aphis thlaspeos Schrank.

Aphis favæ Scopoli.

Aphis atriplicis Fabricius.

Aphis aparines Schrank.

Aphis armata Hausmann.

Aphis dahliæ Mosley.

Aphis hortensis Fabricius.

Aphis atriplicis Buckton.

Aphis euonymi Fabricius.

Aphis ulicis Fabricius.

Rumicifex Amyot.

Meconaphis Amyot.

Linnaeus, Syst. Nat., II, 734, 5 and 736, 16.*

Theobald, Rept. Eco. Zool., 1913, p. 27, 1914.

This very abundant black aphid, which occurs on such a great variety of plants, especially Docks (*Rumex spp.*), Beans (*Fabia spp.*), Poppies (*Papaver spp.*) and *Euonymus spp.*, was found by myself breeding in small colonies on apple trees at Wye in July, 1913, and again at Borough Green in Kent. In the same year I also found numbers on an apple tree near Herne Bay in Kent. In July, 1913, it was also sent me from the Cyder and Fruit Research Station at Long Ashton, near Bristol, from apple trees. In Kent only apterous viviparous females and their larvæ were found, but from Long Ashton alatae, as well as apteræ and larvæ were sent. Specimens from apple trees near Exeter, Devonshire, were also received during the same year.

The so-called "Black Dolphin" or "Collier" appears, however, to be only a casual visitor, and has never been reported as causing any material damage. The apteræ can at once be told from the black *Aphis* (*M.*) *nigra* by being mealy, and from the dark mealy *Aphis crataegi* by being globose and not flattened.

*For other references vide my paper in Journ. Bd. Agr. (England and Wales) 1912, pp. 467:476.

Moreover, the two last never have white flecks upon them, so often noticed in *Aphis rumicis*, especially in the nymphæ.

In the alate female stage it can at once be told from *Aphis cratægi* by the absence of the basal pale abdominal band and general absence of farinose matter. As I have not seen any alatae of *A. nigra*, I cannot compare them, but the resemblance to *rumicis* is great.

***Siphocoryne avenæ*, Fabricius.**

Aphis avenæ Fabricius.

Aphis-avenæ-sativæ Schrank.

Aphis annuæ Oestlund.

Aphis mali Fitch (non Fabricius).

Aphis cratægifoliæ Fitch.

Aphis fitchii Sanderson.

- Fabricius, Ent. Syst. IV, 214, 22, 1774; Syst. Rhyng, 297, 21, 1803.
 Schrank, Fr. Boica, II, p. 104, 1801.
 Kaltenbach, Mono. Pflanz., p. 108, 1854.
 Walker, Ann. Mag. Nat. Hist., Sc. 2, V, p. 269, 1849.
 Fitch, 1st Rept. Nox. & Ben. Ins., St. N. Y., pp. 49-60, 1856.
 Fitch, 4th Ann. Rept. Reg. Univ., N. Y., p. 65, 1851, and p. 66 (= *cratægifoliæ*) and Cat. Hom. N. Y., St. Cat., 1851.
 Walker, Cat. Brit. Mus. Homop., p. 986 (*mali*), 1852.
 Fitch, 6th Rept. Ins. N. Y., pp. 91-97, 1865.
 Walsh, Phil. Ent. Soc., p. 301 (= *mali*), 1862.
 Walsh, Proc. Ent. II, p. 37 (= *mali*), 1867.
 Riley, Am. Ent. I, p. 99 (= *mali*), 1869; and II, p. 178 (= *mali*), 1870.
 Kaltenbach, Die Pflanz. a. d. Klasse, Ins., p. 216, No. 79, 1874.
 Saunders, Rept. Ent. Soc. Ont., p. 344 (= *mali*), 1877.
 Riley & Monell, Bull. U. S. Geol. & Geog. Surv. V, 1, 25 (= *cratægifoliæ*), 1879.
 Thomas, 8th Report St. Ent. Ill., p. 83, 1879.
 Saunders, Canad. Ent. XV, pp. 96-97 (= *mali*), 1883.
 Osborn, Bull. Iowa Agri. Coll., 2, 91 (= *mali*), 1884.
 Saunders, Rept. Ent. Soc. Ont., p. 23 (= *mali*), 1884.
 Fletcher, Rept. Canad. Cent. Exp. Farms, 22 (= *mali*), 1887.
 Forbes, Trans. Ill. St. Hort. Soc., p. 92, 1887.
 Lintner, Rept. Inj. Ins., N. Y., for 1886, p. 118, 1887.
 Oestlund, Aphid. Minn., p. 64 (= *mali*), p. 51 (= *cratægifoliæ*), 1887.
 Riley, Sec. Agri. Rept. U. S. Ent., 1889, p. 348, 351, 1890.
 Hillman, Bull. II, Neb. Agri. Exp. Sta., 1890.
 Hieronymus & Pax., Herb. Cec. fasc. VI, No. 192, 1890.
 Osborn & Sirrine, Proc. Iowa Acad. Sci. I, pt. III, p. 99 (= *cratægifoliæ*), 1893.
 Webster, Journ. N. Y. Ent. Soc. III, p. 119 (= *mali*), 1893.
 Webster, Insect Life, VI, p. 152 (= *mali*), 1893.
 Weed, Trans. Am. Ent. Soc. XX, p. 299 (= *mali*), 1893.
 Bruner, Rept. Nebr. Hort. Soc., p. 172 (= *mali*), 1894.

- Webster, Bull. 51, Ohio Agri. Exp. Sta., pp. 111-117 (= *mali*), 1894.
 Fletcher, Rept. Canad. Cent. Exp. Farms, p. 199, 1895, and p. 163, 1896
 and p. 206, 1898.
 Alwood, Bull. 100, Vag. Agri. Exp. Sta., p. 89, 1899.
 Harvey, Bull. 56, Me. Agri. Exp. Sta., p. 129, 1899, and 15th Rept. Me.
 Agri. Exp. Sta., p. 129.
 Johnson, Bull. 26, (n.s.) U. S. Dept. Agri. (D. E.), p. 80, 1900.
 Luggar, Bull. 69, Minn. Agri. Exp. Sta., p. 192, 1900.
 Sanderson, Bull. 26 (n. s.) U. S. Dept. Agri. (D. E.), p. 67, 1900.
 Sanderson, Trans. Penns. Hort. Soc., p. 45 (= *mali*), 1901.
 Hunter, Bull. 60, Iowa Agri. Exp. Sta., p. 99 (= *mali*), 1901.
 Schonteden, Marcellia, Avellino, II, p. 95, 96, 1903. and Ann. Soc. Ent.
 Belg. 47, p. 178, 1903.
 Pergande, Bull. 44, U. S. Dep. Agri., Div. Ent., p. 7, 1904.
 Tavares, Broteria. IV, p. 103, 1905.
 Marchal, Autun. Mém. Soc. Hist. Nat. XVIII, p. 305, 1905.
 Sanderson, Bull. 74, Del. Coll. Agri. Exp. Sta., pp. 137-149 (= *fitchii*), 1906.
 Theobald, Rept. Eco. Zool. 1905, pp. 30-32, figs. 10, 11, 14, 15 (= *fitchii*),
 1906.
 Gillette, Journ. Eco. Ent. I, p. 308, 1908.
 Schonteden, Mém. Soc. Ent. Belg. XII, p. 217, 1906.
 Gillette & Taylor, Bull. 133, Colo. Agri. Exp. Sta., p. 30, 1908.
 Theobald, Insect Pests of Fruit (= *fitchii*), p. 137, figs. 111-114, 1908.
 Tullgren, Upp. Prak. Ent. XXII, p. 56, 1913.
 Patch, Bull. 233, Maine Agri. Exp. Sta., p. 266, 1914.
 Davis, Bull. 112, U. S. Dep. Agri., 1914 (Oat Aphid).

Aphis prunifolia Fitch is given by Schonteden as a synonym of this species. As far as I can see, Fitch's species is only *Aphis pruni*.

Prunifolia is described by Fitch in his First and Second Report on Noxious and Beneficial Insects of the State of New York, p. 122, 1856.

DESCRIPTION:

Alate viviparous female (spring migrant):

Head, pronotum and thoracic lobes almost black to olive brown, the two last often very shiny; pronotum green in front and behind. Abdomen green, with black lateral spots, 3 to 4 large ones outside and 5 small ones medially; a dark patch in many at base of the cornicles,* one on the inside and two dark bars caudad of the cornicles, the first broad, the second narrow. Anal plate black. Cauda brown or greenish brown in the middle, dark at the edges. The antennæ are shorter than the body, black; the two basal segments nearly equal in length, the second barrel-shaped and narrower than the first; 3rd nearly as long as the 6th,

*Sanderson describes his *fitchii* as having a yellow spot at the base of the cornicles. This I have never seen in any European specimen.

about twice as long as the 4th, with 17-20 sensoria over its whole length, but not so markedly tuberculate as in *kochii* and *cratægi*, but with many more sensoria than in *pomi*; 4th segment with 10-14 sensoria, the same length as the 5th; the 5th with 0-6 sensoria, including the usual sub-apical one; the 6th about as long as the 4th and 5th; the last three imbricated. Cornicles rather short, either brown or pale greenish brown, somewhat swollen in the middle or irregularly cylindrical constricted at the apex, which is more or less flared and, to some extent, constricted at the base; in some specimens the cornicles are almost black. Legs dark, except base of femora and most of the tibiae, which are pale greenish brown to pale green or yellowish. Base of wings green to yellow.

Length 1.5 to 2 mm.; *wing expanse* 6 to 7 mm.

Return alate migrant:

Very similar to the former, but appears to be smaller in most cases, and the 5th antennal segment has seldom more than the usual sub-apical sensorium, but in an occasional specimen 1-2 extra ones may occur. The abdomen more variable, green, yellowish or pale brown.

Variation in sensoria of alate female.

The apple spring migrant may often have no sensoria on segment 5, except the usual sub-apical one, but now and then from 1-3 may occur. This also seems to be the case with "*fitchii*" in America. Those from oats and wheat, the return migrants to the apple and pear, usually have none but the sub-apical one, but now and then 1-3 may also occur. In America it seems that this segment usually has a few sensoria. Pergande figures the second generation—the migratory female—with sensoria on segment 5 and states that segment 3 is always strongly tuberculate, frequently also 4 and sometimes also more or less 5 (Bull. 44, D. E., U. S. Dept. Agri.).

Apterous viviparous female:

Green to yellowish green with often more or less distinct mottled areas or dark green median and lateral lines; oval. Eyes black. Antennæ green, dusky at the tips. Cornicles greenish

brown to brown,* slightly swollen in the middle, flared at the tips, where they are slightly constricted, and also to some extent constricted at the base. Legs pale green; tarsi dusky. Cauda small, pale brownish. Antennæ vary from 5 to 6 segments; when of 5 segments, the third is as long as the fifth; 4th longer than the basal area of the 5th; basal area of latter about $\frac{1}{3}$ the length of the flagellum; when of 6 segments, the 3rd is about as long as the 6th; 4th and 5th about equal in length; the apical segments, where they are darkened, are markedly imbricated. In some specimens there is a marked dorsal median deep green stripe, made up of various shaped patches on each segment, sometimes broadly elongated. A few patches of white powder between the dorsal and lateral darker green stripes on the anterior abdominal segments may occur.

Length 2 mm.

The *larvæ* are yellowish green, with two dark spots on the head; legs brownish to greenish white; cornicles deep brown or all green.

Pupæ light yellowish green.

Oviparous female:

Apterous. Somewhat oval. Yellowish green, yellow to almost green or dull green; head often slightly brownish; also the pronotum, antennæ and legs. Antennæ short, of 5 segments, about or less than half the length of the body; 1st segment wider and longer than 2nd; 3rd not quite as long as 5th; paler at the base; 4th short, only a little longer than base of 5th, with a single marked sensorium; 5th with swollen basal area, about quarter length of flagellum.** Eyes dark, prominent. Proboscis reaches to base of second legs, acuminate, apical segment longer than the penultimate. Hind tibiæ slightly broadened, with 29-32 sensoria, not quite reaching the apex. Cornicles short, brown to black, in some almost green, flared at the tip and constricted at base and apex; markedly imbricated. Cauda moderate, spinose, with three pairs of lateral hairs; blunt at apex and dusky to brown.† Anal plate

*Sanderson says that in America it has a "rusty yellow spot at the base of the cornicles." I have never seen this in European specimens.

**Sanderson says "antennæ with but 6 segments."

†Sanderson mentions a dull reddish or orange spot at the base. This I have never seen.

dark, broadly expanded, spinose, with a few hairs. A small papilla between the cornicles and cauda. Hind tibiae with rather long hairs.

Length .8 to 1 mm.

Male.—Alate. Head and thorax black, shiny. Abdomen black and dull green,* and with dusky lateral spots; dark at the apex. Antennae black, variable in length, not quite as long, to a little longer than the body; 1st segment larger than 2nd; 3rd not quite as long as the 6th; base pale, with 17-20 sensoria over its whole length; 4th about as long as the 5th, thick, with 14-18 sensoria; 5th with 5-12 sensoria; basal area of 6th small. Proboscis dark, reaching the 2nd pair of legs, acuminate, apical segment longer than penultimate. Cornicles black, flared at apex, constricted at base and apex, imbricated. Legs with dark coxae; fore femora green, except at apex, mid and hind dark brown; tibiae green, with dark apices; tarsi dark. Cauda black. Anal black; the cauda with two pairs of lateral hairs and spinose; penis yellow. Wings with brown veins and yellowish-green insertions.

Length 1 to 1.5 mm.

DISTRIBUTION:

Europe generally; America; Africa?

FOOD PLANTS:

Pyrus malus, *Pyrus communis*, *Crataegus* sp., *Avena sativa*, *Avena orientalis* and *Avena fatua*; *Hordeum hexastichon*** and *Hordeum distichon*, *Triticum sativum* and various *Gramineae* spp.? Walker gives *Cydonia vulgaris*, *Sorbus aucuparia*, *Mespilus germanicus* and *Crataegus oxyacanthæ*. Oestlund records it on Wild Crab Apple and Mountain Ash.

Davis, in his recent paper (Bull. 122, U. S. Dept. Agri., 1914), gives the following food plants: Gramineae—Wheat (*Triticum vulgare* and *T. dicoccum*†); Oat (*Avena sativa*), Wild Oat (*A. fatua*);

*Sanderson says light yellowish brown.

**The usual name for Barley is *Hordeum vulgare*, but the cultivated forms are grouped into three races: 6-rowed Barley (*Hordeum sativum hexastichon*); 4-rowed Barley (*Hordeum sativum vulgare*), and 2-rowed Barley (*Hordeum sativum distichon*). *Avena sativa* is the Common Oat; *Avena fatua*, the Wild Oat; *Avena orientalis*, the Tartarian Oat.

†The latter is recorded by Mordwilck as hosts of *Aphis padi*, Kalt.—*avenæ*, Fabr. This is not the *Aphis padi*, Reaum.

Tall Oat Grass (*Arrhenatherum elatius*); Barley (*Hordeum vulgare*); Two-rowed Barley (*H. distichon*); Wall Barley (*Phleum pratense*); Canada Blue Grass (*Poa compressa*); Kentucky Blue Grass (*Poa pratensis*); Annual Meadow Grass (*Poa annua*); Crab Grass (*Syntherisma sanguinale*); Upright Chess (*Bromus racemosus*); Rescue Grass (*Bromus unioloides*); Cheat (*Bromus secalinus*); Hungarian Brome Grass (*Bromus inermis*); Orchard Grass (*Dactylis glomerata*); Italian Rye Grass (*Lolium multiflorum*); Perennial Rye Grass (*Lolium perenne*); Red Top (*Agrostis alba*); Red Fescue (*Festuca rubra*); Sheep's Fescue (*F. ovina*); Meadow Fescue (*F. pratensis*); Hard Fescue (*F. ovina duriuscula*); Reed Canary Grass (*Phalaris arundinacea*); Melic Grass (*Melica bahini* and *M. penicillaris*); Johnson Grass (*Andropogon halepensis*); Broom Corn (*Andropogon sorghum*, var.); Koeler's Grass (*Koeleria cristata*); Wild Rye (*Elymus geniculatus*); Virginia Wild Rye (*Elymus virginicus*); Nodding Wild Rye (*E. canadensis*); Corn (*Zea mays*); Teosinte (*Euchlæna mexicana*); Typhaceæ: Cat-tail (*Typha latifolia*); Ammiaceæ: Celery (*Apium graveolens*); Compositæ: Tick Seed (*Coreopsis* sp.); Malaceæ: Apple (*Malus malus*); Pear (*Pyrus communis*); Hawthorn (*Crataegus coccinea*, etc.); American Mountain Ash (*Sorbus americana*); Quince (*Cydonia vulgaris*); Wild Crab Apple (*Malus* sp.); Rosaceæ: Ninebark (*Opulaster opulifolius*); Amygdalaceæ: Plum (*Prunus* sp.); Choke Cherry (*Padus virginiana*) and Wild Black Cherry (*Padus padus* and *P. serotina*); Pergande also gives *Cornus* sp., *Bursa bursa-pastoris*, *Arctium minus*, all probably accidental hosts.

I have never found it on *Padus*, and it certainly is not the *Aphis padi* of Reaumur.

LIFE-HISTORY:

Fabricius originally described this species from specimens found on Oats (*Avena sativa*). Kaltenbach on *Avena fatua* and *sativa* and on *Hordeum hexastichon* and *distichon*. Thomas (Third Rept., p. 53, 1879) refers to *avenæ* as appearing on the fall wheat and oats in America, working upon the leaves and stalks singly, and that when winter appears that they move down to the ground, some at least entering the soil, and feed upon the sap of the roots, and at the same time he found an alate individual on the blade.

As far as I have observed, the winter is passed in Britain entirely in the egg stage on the apple and pear.

The ova hatch in the beginning of April and by about the 20th of that month I have found numbers of apterous viviparous females on the apple leaves. These apteræ continue to increase through May and towards the end of the month alatæ commence to appear. The earliest date I have of winged females is the 21st, from Hailsham in Sussex. At Wye they have usually appeared about the 29th, but in 1914 many occurred as early as the 10th. These alate viviparous females migrate from the apple and pear until the middle of June, by which time all seem to have disappeared. Pergande and others traced this migration to corn and grasses in America—the so-called *Aphis fitchii* of Sanderson—on the apple, becoming the *Aphis avenæ* of Fabricius on corn. In Britain I have found the same. Apteræ occur on oats, and more rarely barley, from late June onwards. In 1911 I found many as late as September the 19th. By October 15th winged forms have been frequently noticed on self-sown and wild oats, and in most years by the 20th of that month all had flown from the corn back to the apple and pear. But this cannot be general, for the return migrants to the apple seem to appear gradually. Winged females have been for many years noticed to appear on the apples over a much greater length of time. It is possible that many come from wild grasses, although repeated search has failed to reveal them on any kind of grass in the south of England. The alate females on the apple produce living young and these become the apterous oviparous females and the alate males. These sexuales I have found in large numbers year after year in October, and many continue to oviposit late into November. The earliest oviparous females I have found were in October 4th in 1911; the latest on November 15th in 1915. Sanderson says that in America few eggs are laid before September 1st, but in these Islands I have never found any laid as early at that.

Miss Patch says "this species migrates from the apple and certain other members of the Rose family to the oat and other grasses for the summer." She also records it on *Crataegus* at Orono, Maine, U. S. A., in June, as alatæ and pupæ, the latter were green with darker green longitudinal median and sub-lateral lines,

between which ran a row of whitish spots and no rusty or orange-coloured markings near the cornicles.

Davis in his recent paper (Bull. 112, U. S. Dept. Agri., 1914) points out that in America *avenæ* also passes the winter as viviparous females at the lower parts and roots of wheat and other grasses. In the latitude of La Fayette, Indiana, it winters either as viviparous females on grain and grasses or in the egg stage on apple and pear. Further north, he says, this species is probably unable to winter in any but the egg stage, whilst in the southern parts of the United States they may live over winter as viviparous females only, no egg stage appearing. He thus concludes that the apple is not a necessary alternate host. In a recent letter to me this authority thinks that my *Siphocoryne splendens* from Egypt* may be the same as *avenæ*, but it differs markedly in structure, and I have never seen *avenæ* crimson and green in Britain, but Professor Davis says it may be so in America.

DESCRIPTIONS OF AND OBSERVATIONS ON SOME CHALCIDOID HYMENOPTERA.

BY A. A. GIRAULT, GLENNDALE, MD.

***Eupelmus marylandicus*, n. sp.**

Female—Length 1.95 mm., excluding the ovipositor valves, which are straight, compressed somewhat and extruded for a length equal to somewhat over half that of the abdomen. Slender, graceful. Allied to the Australian *pachyscapa*.

Dark metallic purple, the tarsi except the last joint, tips of tibiae narrowly and the distal half (or a little more) of the middle tibia, white or nearly. Fore wings brown from the proximal end of the bend of the submarginal vein distad to apex, the infuscation broken by two distinct, straight, longitudinal, hyaline stripes, the cephalic and shorter from the base of the stigmal vein to apex and including the cephalic wing margin; the other much longer, extending from a point caudad of middle, nearly opposite the middle of the marginal vein to the apex. Stigmal vein slender, nearly two-thirds the length of the postmarginal. Antennæ inserted about

*Bull. Ent. Res.
July, 1916

in the middle of the face, but below the ventral ends of the eyes, the latter shorter than the cheeks. Scape greatly, rectangularly dilated (over twice longer than wide, excluding the bulla); pedicel somewhat longer than wide at apex, subequal to funicle 5; funicle 1, or the "ring-joint," a little wider than long; 2 over twice longer than wide, 3 and 4 subequal, longest, a little longer than 2; 8 a little longer than wide, subequal to club 1. Mandibles tridentate. Wings rather slender. Cephalic raised piece of scutum and the lateral ridge weak, yet distinct. Axillæ small, convex barely separated, or not at all; scutellum globular, convex. Pronotum quadrate. Abdomen a third longer than the thorax. Sculpture weak. Cephalic femur compressed. Middle tarsi with black teeth beneath.

Described from one female captured by sweeping in the forest, Chevy Chase Lake, Maryland, April 24, 1915.

Type—Catalogue No. 20094, U. S. N. M., the above female on a tag, the head and a fore wing on a slide.

***Eupelmus speciosus*, n. sp.**

Female—Length 2.00 mm., the ovipositor valves shortly extruded.

Light orange yellow, the wings hyaline or sometimes slightly infuscated under the marginal vein, the head dark metallic green (except the mouth) as is also the distal third of the scutellum; legs, ovipositor valves and scape pale yellow. Pedicel suffused with yellow; rest of antenna black. Scape a little compressed; pedicel twice longer than wide at apex, longer than any of the funicle joints, of which 4 is longest, nearly twice longer than wide; 1 wider than long, 2 a fourth longer than wide, 3 next longest, 8 somewhat wider than long. Postmarginal vein but very slightly longer than the stigmal. Head, axillæ and scutellum densely scaly, rest of thorax delicately so. Lateral ridges of scutum joined across near caudal margin, the raised triangular piece reaching to about the middle. Ovipositor valves black at extreme base. Abdomen narrowing gradually to apex, as long as the rest of the body combined. Middle tarsi with black teeth beneath.

Described from seven females in the collection of the U. S. National Museum, on tags bearing the following label: "4841⁰¹¹, April 3, 1890." Locality, Washington, D. C.?

Types—Catalogue No. 20091, U. S. N. M., the above specimens, a pair of antennæ on a slide.

Eupelmus cyaniceps Ashmead **utahensis**, new variety.

Female—Length 2.00 mm., excluding the ovipositor, which is two-thirds the length of the abdomen.

Differs from the description of *rosæ* Ashmead in having the cephalic femur metallic. Differs from *cleri* in having the post-marginal vein no longer than the stigmal and the ovipositor valves broadly dusky at tips; runs to *cyaniceps* Ashmead, but differs in being much less robust, in having the cephalic tibiæ nearly wholly metallic. *Caudal legs metallic* (except tarsi); middle tibiæ yellow, also the femur except proximad more or less. Funicle 1 much wider than long, 2 and 3 subequal, longest, each about twice longer than wide.

Described from two females in the collection of the U.S. N. M., from American Fork, Utah, July.

Types—Catalogue No. 20092, U. S. N. M., the above specimens on tags, a head and fore wing on a slide.

Compared with types of *cleri* and *cyaniceps*. Middle white portion of ovipositor much longer than the basal blue portion, shorter than the distal dusky portion.

Eupelmus cyaniceps Ashmead **amicus**, new variety.

Female—Like the typical form, but the ovipositor valves more slender and the white middle portion shorter than either basal or distal portion (in the typical form the yellowish middle portion is longest.)

Described from three pairs on tags in the U. S. N. M., labelled: "From *Bruchus amicus* Horn, Las Cruces, New Mexico."

Types—Catalogue No. 20093, U. S. N. M., the above specimens (three tags).

Eupelmus charitopoides, new species.

Female—Length 1.85 mm., excluding the ovipositor, which is extruded for a length equal to that of the abdomen.

Dark metallic green, the wings subhyaline; tarsi, knees, tips of cephalic tibia, distal half of caudal tibiæ and middle tibiæ except

a cinctus just below the knee, reddish brown; teeth of middle tarsus ventrad white, dense, soft. Venation yellow. Postmarginal vein nearly twice the length of the stigmal, which is moderately long. Head and thorax very delicately scaly. Axillæ barely separated inwardly. Lateral ridges of scutum distinct, the raised cephalic, mesal portion small. Antennæ inserted below the middle of the face, slightly below the ventral ends of the eyes; scape distinctly much compressed; pedicel twice longer than wide at apex, subequal to funicle 5; funicle 1 slightly longer than wide, 2 and 4 longest, each about thrice longer than wide, 8 thickest, about a half longer than wide. Differs from *Charitopus schwarzi* Ashmead in being shorter, the stigmal vein is twice longer, the legs differently coloured and so on.

Described from one female in the U. S. N. M. from Harper's Ferry, West Virginia, May 19.

Type—Catalogue No. 20094, U. S. N. M., the above specimens on a tag, an antenna on a slide.

Scutellista cyanea, Motschoulsky.

Several pairs reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa, September 6, 1915 (C. C. Gowdey).

Eurytoma galeati, new species.

Female—Length 1.95 mm. Abdomen as long as the rest of the body.

Agrees with the description of *transvaalensis* Cameron, except as follows: The scape is entirely reddish, the middle and caudal tibiæ each bear a distinct, middle black cinctus; the marginal vein is distinctly somewhat longer than the postmarginal. On the depressed basin of the propodeum, which is reticulated, there is a nearly half complete median channel composed of two foveæ end to end on each side of a very narrow median carina. Club 2-jointed; funicles 4 and 5 each somewhat longer than wide, longer than the pedicel. Abdominal petiole a little wider than long. Segment 5 of abdomen longest, equal to 3 and 4 united, abdomen dorsad glabrous, finely scaly distad of segment 5 and on the lateral aspect. Mesopleurum finely punctate, caudal half finely striate cephalo-caudad. Prepectus mostly glabrous. Punctures dense,

distinct. Distal segment of abdomen long-pointed. Stigmal vein slightly shorter than the postmarginal. Funicle 1 somewhat over half the length of the body of the scape.

Described from two females reared from *Ceroplastes galeatus* Newstead, Kampala, Uganda, Africa (C. C. Gowdey), September, 1915.

Types—Catalogue No. 20095, U. S. N. M., the above specimens on tags, plus a slide bearing antennæ, a fore wing, caudal legs, a fore leg and a middle tibia.

***Aphelinus automatus* Girault.**

A female, Vienna, Virginia, from *Aphis setariæ* (W. F. Turner).

***Coelopisthia confusa*, new species.**

Female—The same in stature, and so forth, as *fumosipennis* Gahan, but differing as follows: The legs (excluding the concolorous coxæ) are darker, being reddish; the antennæ are inserted a little higher up on the face and differ notably in that the ring-joints are normal (that is not large, the second not subquadrate), the scape is red, the pedicel nearly all dusky black, funicle 1 a little wider than long, 4-6 subequal, much wider than long; the infuscation of the fore wing is fainter and more diffused, yet distinct. At least one mandible 4-dentate (other not seen). Flagellum black.

Described from one female in the collections of the U. S. N. M., labelled "*Semiotellus chalcidiphagus* Walsh., Washington, D. C." This species, superficially, is very similar to *Homoporus crassinervis* Thomson.

Type—Catalogue No. 20096, U. S. N. M., the above female on a tag, a pair of wings, a caudal tibia and the antennæ on a slide.

A NEW GENUS OF PTEROMALID CHALCIDOID HYMENOPTERA FROM NORTH AMERICA.

BY A. A. GIRAULT, GLENDALE, MD.

***Tomocerodes*, new genus.**

Female.—Belongs to the Eunotinae. Like *Tomocera* Howard, except that the caudal tibia is armed with a very long, stout spur,

as in *Ophelosia*. Antennæ 8-jointed (excluding a very minute ring-joint). Segment 2 of the abdomen occupying the entire surface. Scutellum without a delicate cross-suture near apex. Male antennæ 7-jointed, the funicle joints as in male *Eurytoma*, the club as long as the scape and solid; a very minute ring-joint, but not counted. Abdomen with a scanty tuft of hairs at base on each side. A short postmarginal vein, as in *Tomocera*. Mandibles tridentate, not especially large.

***Tomocerodes americana*, new species.**

Female.—Of the habitus and stature of *Tomocera* genotype. Dark reddish brown, the fore wing infuscated as in the named species, except that the infuscation is rectangular rather than ovate, its ends subtruncate, its proximal end not past the base of the marginal vein (but conical at caudal wing margin and somewhat proximad of the marginal vein) and distad it extends somewhat closer to the apex. Dorsal abdomen (except the sides at base), propodeum (except laterad of the lateral carina except at caudal margin) and all the dorsal thorax laterad of the axillæ and scutellum, metallic purplish; also venter of abdomen more or less (especially distad). Club black, the funicle and tibiæ washed distinctly with purple. Stigmal vein longer than the shortened marginal. Marginal fringe of fore wing somewhat longer than usual (that is, not extremely short). Pedicel much longer than any of the funicle joints, the latter moniliform, 1-2 subequal, smallest, 5 largest, over twice the size of 1. Club not quite as long as the funicle. Abdomen glabrous. Head and thorax very delicately scaly. Propodeum a little longer at the meson, with median and lateral carinæ, the latter closer to the meson than to the minute spiracle; between these carinæ, a cross-carina near the cephalic margin (longer) and one near apex, both curved a little; also a looped carina from base of the lateral carina over to near the spiracle. Dorsal thorax with isolated black bristles. Axillæ not advanced. Scutum nearly as long as the scutellum.

Male.—A third smaller and entirely metallic purple, the wings hyaline, the tarsi brown. The scape is still long, but much shorter than in the female, the pedicel globular; funicles 1 and 2 close

together, 1 ovate (the axis oblique), the others triangular, the base of each triangle about half the length of the club; each funicle joint with a tuft of long silky hair from the apex of their lateral prolongation. Mandibles tridentate.

Described from one pair in the U. S. N. M., labelled "Oaxaca, Mexico, Koebele."

Types.—Catalogue No. 20192, U. S. N. M., the above specimens plus a slide bearing the heads and caudal tibiae and a female fore wing.

JOHN BICKERTON WILLIAMS, F. Z. S.

We regret to record the death, on Sunday, May 28, 1916, of Mr. John Bickerton Williams, one of the oldest members of our Society. Mr. Williams had been in Toronto only about three weeks since his return from Bermuda, where he had spent the winter and where his health, which had been failing for the past few years, had apparently much improved.

Mr. Williams was born in Liverpool, England, in 1848, and was educated as an architect, practising a few years in Birmingham before coming out to Canada in 1881. Since then he resided chiefly in Toronto, though he spent a few years in Montreal in the early nineties. He was a Fellow of the Zoological Society and was interested in various branches of zoology, but more especially in ornithology, of which he had a wide and accurate knowledge. Since 1906, when he was appointed Cataloguer of the Biological Museum of the University of Toronto, he did a great deal of useful work in identifying, arranging and labeling the museum specimens, particularly the birds. In entomology he also accomplished much useful work for the museum, his interest centering in the butterflies; and he contributed several articles to the Canadian Entomologist and the Annual Reports of our Society. He was for many years a most valued member of the Toronto Branch of the Society, acting for long periods as Secretary-Treasurer and as Librarian-Curator. He was also Honorary Curator of the Royal Canadian Institute.

Mr. Williams was unmarried, his only relative in Canada being a brother, Mr. A. R. Williams, of Toronto.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A FEW DAYS IN-NEWFOUNDLAND.

BY E. M. WALKER, TORONTO.

(Continued from page 221.)

On my fourth day at Spruce Brook I crossed the lake in a skiff, and, following the directions of Mr. Whittington, started on the trail to Beaver Pond, a small lake surrounded by dense woods, which I reached after a few minutes' walk. Here I was equipped with a canoe, kept by the proprietors of the Log Cabin Hotel for the use of fishing parties, and I was thus able to explore all parts of the lake with ease. I found but one marshy spot of any considerable size, at the head of the lake, where it was fed by a cold trout stream.

At this spot there were a few damsel-flies and two or three *Leucorrhinias* flitting over the lily-pads and pond-weeds, but no species was present in even moderately large numbers. Five kinds of damsel-flies were taken here, viz., *Enallagma calverti*, *E. ebrium*, *Cænagrion resolutum*, *C. interrogatum* and *Ischnura verticalis* Say, the last named species being new to Newfoundland, though a very common insect in Eastern Canada and the United States. Of *C. interrogatum* I took but one more specimen. The others were not uncommon.

Of larger forms our familiar *Libellula quadrimaculata* L., found almost everywhere in Canada, as well as in the Old World, was the only species taken at this spot, the *Leucorrhinias* having been frightened away, but a pair of exuviae of *Æshna canadensis*, E. Walk., found upon a tangle of algae, furnished another record for Newfoundland, although the only adult *Æshnas* I saw at the lake were two or three large blue forms, which I feel sure were *A. eremita* Scudd.

Just after leaving the marsh, I was attracted by a clear-winged dragonfly, evidently a Corduline, speeding along a few feet above the water and closely following the shore-line. I took up a position

in the shelter of a bush and waited for a chance to strike with the net from behind. In a few minutes I had netted a male of *Cordulia shurtleffi* Scudd, and soon afterwards I had several more. This is a beautiful insect with a bronze-green body and brilliant green eyes. It is a very characteristic northern species, common across Canada to Vancouver Island. I also took here a fine male of *Somatochlora cingulata* Selys, the first I had ever seen. With its dark bronze body, with white transverse abdominal lines and bright green eyes, it looks very like a large form of *S. albicincta*, but it is much less common. It was the last dragonfly I captured in Newfoundland, as I was now obliged to return to the hotel, and, on the same day, to start on my homeward journey.

I have made several allusions to the scarcity of dragonflies in the vicinity of Spruce Brook. How are we to account for such a scarcity under apparently favourable conditions? Of course, there are good and bad years for dragonflies, as for everything else, but I am inclined to believe that some other cause than the usual seasonal ones was operating here. It is worthy of note that all the lakes and ponds where I collected were connected with trout streams, and it is well known that brook trout feed upon dragon-fly larvæ. Beaver Pond, particularly, teems with trout, and is a favourite place for trout-fishing. I saw numbers of fingerlings at the spot when I collected most of my dragonflies. It is therefore a possibility that the scarcity of dragonflies in this locality was due, in part at least, to the abundance of brook trout.

There appeared to be a similar scarcity of other aquatic insects, very few caddis-flies, e.g., having been observed. The little dark *Mystacides sepulchralis* was rather common about Beaver Pond, but the only other species noted were a few specimens of a Limnephilid, not yet determined, and a single example of the large *Glyptotælius hostilis*, found in a spider's web. Like most of the dragonflies noted, this species ranges widely across the continent in the north.

Diptera and Hymenoptera seemed to be fairly plentiful at Spruce Brook, in individuals if not in species, though little effort was made to collect them. One of the best places to obtain them was a glass-covered passage connecting two parts of the Log

Cabin Hotel. As the doors were kept open, these insects entered in large numbers and collected on the window-panes. The most numerous were the flies, though a large proportion of these were ordinary blue-bottles (*Calliphora erythrocephala*) and allied forms, such as *Lucilia cæsar* and *Cynomyopsis cadaverina*.¹ An undetermined Anthomyid was very common, but no house-flies were seen. Syrphididæ were numerous, the following species having been taken here and elsewhere in the vicinity: *Sericomyia chalcopyga* Lw., *Syrphus ribesii* L., *S. torvus* O. S., *S. geniculatus* Macq., *S. umbellatarum* Sch., *Sphærophoria cylindrica* Say., *Xylota vecors* O. S., *Temnostoma æquale* Lw., *T. alternans* and *Eristalis meigenii* Wied.²

Of Hymenoptera wasps were plentiful and included at least three species of *Vespa*, viz., *V. consobrina*, *borealis* and *diabolica*. Bumblebees were abundant in the bushy clearings and roadways, but nearly all belonged to the characteristic Newfoundland species, *Bombus bolsteri* Franklin, though I took also *B. borealis*. The large leaf-cutter bee, *Megachile vidua* was also occasionally seen, but no attempt was made to collect the smaller bees, nor, in fact, any of the Hymenoptera, the few captures made being quite incidental. These few included two saw-flies, *Macrophya trisyllaba* and *Trichiosoma lanuginosum*, a large Cimbicid, which I have taken as far west as Banff, Alta.; a horntail, *Urocerus flavicornis*; a long-tailed ichneumon-fly, *Rhyssa albomaculata*, both of similar wide distribution, and a smaller member of the same family, *Ichneumon feralis*.

The other orders of insects were also of necessity left unmolested. They seemed to be equally poorly represented, the scarcity of butterflies being particularly noticeable. I had expected to pick up a few interesting northern forms, of such genera as *Oeneis*, *Brenthis* and *Eurymus*, but saw only a few of our commonest Canadian species, such as *Brenthis myrina* and *Eucanessa antiopa*.

Of course, no conclusions can be drawn from such fragmentary observations as these, as to the extent of the insect fauna of Spruce

1. Determinations by C. H. T. Townsend. 2. Determinations by M. C. Van Duzee (except *T. alternans*).

Brook, much less that of Newfoundland, but my general impression was that of a fauna poor in species, not only of insects, but of other animal groups. The evidence for this seemed to be fairly definite as regards the Orthoptera, and it is well-known to be true of some of the vertebrate groups. There are no native reptiles nor Amphibia in Newfoundland, and many of the characteristic Canadian mammals are absent, e.g., the Moose, Wapiti, Brown Bear (*Ursus richardsoni*), the Sciuridæ, or squirrel family. etc. In the small streams I saw only trout and stickleback; no minnows, nor other Cyprinoids, and no crayfish.

The absence of these animals, or some of them, has been explained as a result of the Glacial Period, during which Newfoundland, already separate from the continent of North America, was independently glaciated or partially covered by an ice-sheet of its own. As a result, its fauna has been in large measure exterminated, instead of being pushed farther south, as on the mainland, and the re-establishment of such exterminated species on the return of favourable conditions has been in many cases impossible.

A faunistic study of Newfoundland is a great desideratum, especially of those groups of animals to whose natural means of distribution a short distance over sea acts as a barrier. Such, for example, are flightless insects, or those incapable of sustained flight, e.g., many Orthoptera, most vertebrates except birds, exclusively fresh-water fishes, the larger Crustacea, land and fresh-water Mollusca, etc. It is among these same groups, except the Mollusca, that we have already noted evidence of a paucity of species. As regards the Mollusca, I have practically no data at hand. I found a few land and fresh-water forms, including a single Mussel (*Anodonta* sp.), which was common in Beaver Pond, a few fresh-water snails, such as the common *Planorbis campanulatus*, and a few land forms, of which the large *Succinea ovalis* was very plentiful. I also picked up *Pyramidula cronkhitei anthonyi*, a little striated form common almost everywhere in Canada, *Agriolimax agrestis*, a common garden slug, introduced from Europe, and *Helix hortensis*. This last form, already recorded from Newfoundland by Prof. Cockerell, is a species of very interesting distribution, occurring on the eastern coast of North America

and the adjacent islands, from New England to Labrador, in Greenland, Iceland and Western Europe. It is one of the forms whose distribution supports the theory of former connections between these land-masses.

My trip to Newfoundland, from the dragonfly standpoint, was certainly not a success, yet I left the island very reluctantly, realizing more keenly than ever before, that on a long trip to a strange locality one must be prepared to remain there long enough to find the conditions of environment most favourable to the group one is collecting or studying, and to be reasonably sure of a fair proportion of good weather.

APHIDIDÆ FOUND ON THE APPLE IN BRITAIN
AND THE
DESCRIPTION OF A NEW SPECIES FROM AFRICA.

BY F. V. THEOBALD, M.A.

(Continued from page 242.)

Phorodon humuli Schrank.

Aphis humuli Schrank.

Aphis mahaleb Koch.

Aphis pruni-mahaleb Fonscolombe.

Humifex Amyot.

Aphis pruni Scopoli?

Schrank, Fn. Boica, II, 110n, 1199, 1801.

Kaltenbach, Mono. Pflanz., p. 36, 1843.

Walker, Ann. Nat. Hist., Se. 2, VI, p. 120, 98, 1850.

Koch, Die Pflanz., p. 113, 47, figs. 150-151, pl. XXI, 1857.

Fonscolombe, Ann. Soc. Ent. Fr., X, 175, 15, 187?

Amyot, Ann. Soc. Ent. Fr., 2 Se., V, p. 477, 1872.

Buckton, Mono. Brit. Aph., I, p. 166, pls. XXX and XXXI, figs. 1-4, 1887.

Theobald, Insect and Allied Pests Fruit, pp. 247-252, figs. 181-183, 1908.

Theobald, Rept. Eco. Zool. year 1911, pp. 33-34, 1912.

Scopoli, Ent. Carn., 138, 406, 1763?

This well known hop and prune aphid has been found by me once on apple. It was not only living on the apple foliage, but
August, 1916

was reproducing and developed large colonies at Wye in August and September 1911, which gave rise to an alate brood which migrated during the latter month. It is possible that Scopoli's *Aphis pruni* is this insect.

***Aphis pomonella* nov. sp.**

Alate viviparous female:

Antennæ shorter than body; first segment larger than the second; third a little longer than the fourth, shorter than the sixth, with 5 to 6 round sensoria along its whole length; fourth about the same length as the fifth, the latter with normal sub-apical sensorium; sixth about as long as fourth and fifth, its basal area half as long as the flagellum. All the segments imbricated, the two basal ones dark; base of third and basal half of fourth paler. Head with slight lateral tubercles and slightly raised in the middle. Proboscis reaching to the third coxæ, acuminate. Pronotum with lateral papillæ. Head apparently brownish and green. Eyes



Fig. 9.—*Aphis pomonella* nov. sp. A, Head and antenna of alate viviparous female; a, head of another specimen. B, *A. kochii*; b, hind tibia. C, *Siphocoryne avenae*; c, hind tibia.

dark. Thoracic lobes dark. Abdomen apparently greenish with three large, dark lateral spots before the cornicles. Cornicles moderately long, black, slightly swelling towards the base, markedly imbricated and serrated laterally. Cauda blackish, about half the length of the cornicles, spinose with three pairs of lateral hairs. Anal plate dark, spinose, with two long, apical hairs on each side. A large papilla on each side between the cornicles and cauda, and traces of 3 lateral abdominal ones between the cornicles and thorax. Front legs green with black apices to the tibiæ and black tarsi; hind legs with dark femora, except at the base; coxæ black. Wings normal, veins and stigma yellowish brown to yellowish green.

Length 1.2 to 1.6 mm.

LOCALITY:

Nairobi, British East Africa (T. J. Anderson).

FOOD PLANT: The apple.

Described from a number of alate females preserved in spirit. The colour appears greenish. It somewhat resembles De Geer's *Aphis pomi*, but can at once be separated by (1) the different antennæ and (2) by the shorter cornicles. *Aphis pomi* has a greater number of sensoria on segment 3 of the antennæ, and more irregularly disposed, and also some on segment 4. There were also some nymphæ in which the cornicles are shorter and thicker.

OTHER SPECIES ON APPLE IN AMERICA.

Four other species are recorded on the apple in America, namely:—

1. *Myzus persicæ* Sulzer (Patch, Bull. 233, Maine Agri. Exp. Sta., p. 267, 1914).

2. *Aphis brevis* Sanderson (Bull. 74, Del. Coll. Agri. Exp. Sta., p. 157, 1906). This has not so far been found in Europe. It also feeds on quince, and Patch (p. 257) records it on *Cratægus*. It migrates in summer to clover, sweet peas, etc. On hawthorn it causes the leaves to become distorted into dark purple curls.

3. *Aphis bakeri* Cowen (Bull. 31, Tech. Se. Colo. Exp. Sta., p. 118, 1895) is also an apple pest in America and migrates to clover (Gillette and Taylor, Bull. 133 Agri. Exp. Sta., Col. Agri. Col., 1908).

4. *Aphis medicaginis* Koch, is recorded by Gillette (Journ. Eco. Ent., I, p. 308, 1908, and Bull. 133 Colo. Agri. Coll. Exp. Sta., p. 32, 1908) on tender, new apple shoots.

A NEW GENUS OF LELAPINE CHALCID FLIES FROM THE UNITED STATES.

BY A. A. GIRAULT, GLENNDALE, MD.

The following genus is similar to the Australian *Uriolelaps* Girault, but there are no perfect wings, and only one ring-joint (though apparently two by transverse central division of the one), the antennæ 12-jointed, the club 2-jointed.

August, 1916

Apterolaelaps, new genus.

FEMALE—Name proposed by Ashmead, but never made valid by description of a genotype.

Apterolaelaps nigriscutum, new species. Genotype.

FEMALE—Length 3.00 mm.

Reddish yellow, the following parts black: Upper third of occiput except dorsad centrally, vertex, upper half of face (mostly mesad), antenna (except scape, pedicel, ring-joint, funicle 1 and narrowly, extreme apex of club); scutum (except cephalic third), the parapsides and the abdomen except its petiole, dorsolaterad at proximal half of segment 2, segments 3-5 (all short) and the meson of venter narrowly. Head and thorax densely scaly-reticulate, the scutellum long-striate distad of the cross-suture, the propodeum with a median ruga and irregular longitudinal rugæ, the neck distinct. Vertex with about a half-dozen long, black setæ; the scutellum with a similar seta laterad at the cross-suture, the cephalic scutum hairy. Caudal margin of scutum broadly arcuate at the meson. Segment 2 of abdomen glabrous, the rest of the abdomen with short, sparse pubescence. Petiole rugulose. Head wider than the thorax, the antennæ inserted on a level with the ventral ends of the eyes, their scrobes long-triangular, reaching nearly to the cephalic ocellus, cross-striate, divided by a thin carina; an arcuate cross-carina just ventrad of the antennæ. Club 2 a little longest of the flagellum; pedicel a little longer than funicle 1, the latter twice longer than wide, 4 quadrate, 7 somewhat wider than long. Mandibles tridentate.

From one female in the U. S. National Museum, Fort Pendleton, West Virginia, "10.7."

TYPE 1—Catalogue No. 20306, U. S. N. M., the female on a tag, the head, pair of wings and caudal tibiæ on a slide.

Fore wings minute, linear, subhyaline, four times longer than wide, the marginal vein with long bristles, half the length of the submarginal and terminating at wing apex; the caudal wings are only somewhat longer than wide.

DESCRIPTIONS OF AND OBSERVATIONS ON SOME CHALCIDOID HYMENOPTERA—II.

BY A. A. GIRAULT, GLENNDALE, MD.

(Continued from page 246.)

The following is a table to the North American Species of *Euplectrus* Westwood, based on a study of the types, except in the case of Provancher's species. The latter are genuine species of the genus (perhaps excepting *mellipes*).

Females.—Legs all yellow. Propodeum with a median carina. The species do not differ much in sculpture.

Abdomen yellow.

Abdomen black above at distal third and along the margins.

Scutum with a more or less distinct median carina.....*catocalæ* Howard.

Abdomen entirely yellow except the lateral and proximal margins. Scutum with a median carina. Propodeum glabrous.

Male mouth broadly white.....*comstockii* Howard.

Male face entirely black.....*platypenæ* Howard.

The same but the abdomen with a black area at meson at base of distal third. Mouth in both sexes white. Propodeum glabrous. Median carina on scutum more or less distinct.....*leucotrophis* Howard.

(=*frontalis* Howard).

The same but mouth black; propodeum coarsely

scaly.....*marginatus* Ashmead.

Abdomen black. Pronotum not rugose.

Black.....*mellipes* Provancher.

Metallic.....*lucens* Provancher.

Abdomen black with a large basal area above.

Submetallic.....*viridæneus* Provancher.

Euplectrus insuetus Gahan (types examined) is not an euplectrine. The caudal tibial spurs are not very large; the scutellum bears a true lateral groove (*mesad* of the bristles).

Diaulinus intermedius new species.

Female.—Like *begini* Crawford but the annulus on the caudal tibiae is *distinctly* broader than the yellow proximad of it (over

twice broader), the postmarginal vein is subequal to the stigmal (distinctly longer in *begini*) and the funicle joints are not subequal. The mandibles are 4- and 5-dentate in both species, and in both the caudal tibial spurs are single. Differs from *pulchripes* in that the said annulus is narrower, not extending to the middle (distad of it in *pulchripes*); also the scape is wholly black (white at basal third in the other species). In *pulchripes*, both mandibles are 5-dentate and the caudal tibial spurs single. From *websteri* in the colour of the legs; the median carina of the propodeum is distinct, not as in *pulchripes* but very delicate as in *websteri* and *begini*; and in *websteri* the postmarginal vein is longer than the stigmal. In *websteri* the mandibles and scape are as in *pulchripes*, also the caudal tibial spur.

Propodeal spiracles minute and round, the lateral carinae absent. Funicle 1 longer than wide, 2 subquadrate. Club with a distinct terminal nipple in all four species and this terminates a small conical joint, so that the club is 4-jointed.

Described from one female reared at Kingston, Rhode Island, January 6, 1916, from *Phytomyza chrysanthemi* (A. E. Stone).

Type.—Catalogue No. 20193, U. S. N. M., the specimen in fragments on a slide.

Pseudiglyphomyia coptodiscæ new species.

Female.—Length, 1.60 mm. Characterized by bearing on the fore wing an obcuneate brown stain from the stigmal vein and of moderate size (extending nearly across the blade).

Lemon yellow, the following parts dark metallic green; Occiput at upper half, ocellar area, proximal half of pedicel, scape except at extreme base, apex of the neck of prothorax, somewhat over the cephalic third of the scutum (except at lateral margin), the green area with a scalloped caudal margin, the scutellum except lateral margins except at base and the cephalic and caudal margins between the grooves (the cephalic more broadly yellow and irregular), postscutellum except lateral and apical margins, propodeum except laterad of the spiracle, dorsal thorax laterad of the postscutellum and apical scutellum except at lateral margin, base of abdomen narrowly (except at meson more or less), caudal coxæ dorso-proximad broadly, a rather broad stripe around abdomen just

distad of the middle, then a very narrow one (dorsad) and then a slightly broader one near apex, the three more or less fused along the meson, the apical one not as broad as the first one at middle. Middle tibia with a central submetallic cinctus. Propodeum with a median carina only. Thorax scaly. Postmarginal vein not quite so long as the stigmal. Funicle 1 a half longer than wide, 2 somewhat shorter; club terminating in a long conical spine. Pedical as long as funicle 1 or a little longer. Mandibles 5-dentate. Antennæ brownish.

The male is similar but the antennæ are all light yellow (except pedicel and apex of scape broadly, which are darker), the occiput has only a minute dark spot on each side, upper half, the pronotum has a narrow median line at cephalic half from the metallic apex of neck, the scutellum is green between the grooves except very narrowly at apex, the line at base of abdomen is triangular, large, extending nearly to lateral margins while the narrow distal two stripes of the abdomen are absent, the middle stripe with a large rectangular area against it caudad at meson. Also, the terminal spine of the club is small.

From one pair reared from *Coptodisca splendoriferella*, Madisonville, Kentucky, October 16, 1899.

Types.—Catalogue No. 20194, U. S. N. M., the pair on tags, the heads and a male fore wing on a slide.

Asaphes americana Girault.

One pair reared from the clover aphid, Lexington, Kentucky, May 28, 1890 (H. Garman). Compared with types.

The marginal vein is somewhat dilated distad. Petiole of abdomen somewhat longer than wide, longitudinally striate. Abdomen glabrous, segment 2 longest, occupying nearly a third of the surface, 3 large yet somewhat shorter than 2, extending to beyond the middle; 4 half the length of 3, with four cross-rows of minute reddish setæ (except along the median line). Propodeum rugoso-punctate and with a short neck; *scutellum with a distinct punctate cross-suture* a little before apex, glabrous distad of it. Parapsidal furrows complete. Axillæ and caudal margin of parapside, glabrous. Pronotum transverse-quadrate, shorter than the scutum.

Trichogrammatomyia new genus.

Female.—In my table to the *Chaetostrichini* runs to *Brachygramma* Girault (there is a ring-joint, the antennæ 7-jointed); but the following differences: The marginal vein is not stout yet not long (about six times longer than wide, nearly twice the length of the well-developed stigmal); the ovipositor is inserted proximad of the middle of the venter by a little; the marginal fringes of the not broad fore wings are long (more or less a third the greatest wing-width), the club is not much wider than the funicle; the discal ciliation of the fore wing is moderate and bears regular lines cephalad and caudad only. Caudal wings narrow, not long, with two lines of discal cilia, the caudal marginal cilia as long as the marginal cilia of the fore wing. *Habitus* of *Trichogramma*. No oblique line of setæ from the stigmal vein. Caudal femur stouter, the tarsal joints more or less equal, longer than wide. Mandibles with two acute teeth and an inner oblique truncation.

The male antenna has the flagellum filiform, only one funicle joint which is nearly twice longer than wide and the club is divided near the middle, the two joints about as long as the funicle or the pedicel; funicle and club with long, stiff hairs.

Trichogrammatomyia tortricis new species. Genotype.

Female.—Length 0.50 mm.

Black, the fore wings dusky from base to end of the stigmal vein, the venation dusky. Face, vertex, lateral margins and median line of scutum and distal third of scutum (more at the meson), orange yellow. Club twice longer than its greatest width (at middle), a little longer than the scape, 1 hemispherical, 2 conical, not spined at apex, over twice the length of 1. Funicle joints subequal, each over twice wider than long; pedicel twice or more the length of the funicle. Fore wings with about twelve lines of discal cilia where widest, the ciliation extending back to the base of the marginal vein (centrally). Tarsi pale.

Described from one male, and seven females from the eggs of *Tortrix cerasivorana*, Guelph, Ontario, Canada, (C. J. S. Bethune).

Types.—Catalogue No. 20195, U. S. N. M., the specimens on two slides.

BEES OF CANADA.—FAMILY MEGACHILIDÆ.

BY F. W. L. SLADEN. OTTAWA.

Principal Characters of Family.—Long-tongued bees, wings with only two submarginal cells, female with pollen brush on underside of abdomen, or, in parasitic genera, absent. The two basal joints of labial palpi very elongate, following joints minute, labrum not exposed.

TABLE OF GENERA.

- (Where the genus contains only one species this is included. Subgenera are not included, as a rule. Whether *Chlorosmia*, *Alcidanea*, *Autochelestoma*, *Andronicus*, and possibly *Monumetha* should be entitled to generic rank, or be regarded merely as subgenera, is a matter of opinion. The super-generic name for this group should be *Chelestoma* Lat.).
1. Skin of abdomen with pale bands or spots, or second recurrent nervure received by submarginal nervure beyond apex of second submarginal cell, Subfamily *Anthidiinæ*.....2.
 - No pale bands or spots on abdomen, second recurrent nervure always received by second submarginal cell.....3.
 2. Margin of 7th dorsal segment in male toothed, female with pollen brush.....*Anthidium* Fab.2a.
 - Margin of 7th dorsal segment in ♂ simple, female without pollen brush *Stelis* Pz.
 - 2a. No pulvillus between claws, makes cottony nest, subg. *Anthidium* Ckll.
 - Pulvillus between claws, makes resin nest (Cockerell), subg. *Dianthidium* Ckll.
 3. A pulvillus between claws, abdomen strongly convex, Subfamily *Osmiina*.....4.
 - No pulvillus between claws, abdomen more or less flattened. Subfamily *Megachilina*.....17
 4. Base of abdomen bordered with a strong transverse ridge, insect coarsely punctured, ♂ with only two ventral segments fully exposed *Heriades*, Spin.
 - Base of abdomen not bordered with strong ridge.

5. Base of abdomen strongly concave, the definite basin thus formed impunctate *Ashmeadiella*, Ckll.
No definite basin on base of abdomen.....6.
6. Not very elongate, cubital nervure between first transverse cubital nervure and first recurrent nervure usually as long as, never less than one-half as long as, first transverse cubital nervure.....7.
Very elongate, cubital nervure between first transverse cubital nervure and first recurrent nervure half or less than half as long as first transverse cubital nervure, ♂ with small lateral spine-like tooth on segment 6.....8.
7. Head with two large teeth beneath, nearly the whole of clypeus impunctate, two small tubercles on margin of clypeus near centre, mandibles very long
.....*Cephalosmia* n.g., 1027, *armaticeps*, Cr.
Invermere, B. C., Okanagan Landing, B. C.—IV, V, VI.
Cheeks not armed, clypeus punctured.....*Osmia*, Spin.
8. Males.....9.
Females.....13.
9. Brilliant metallic green, ventral segments 1 and 2 with small median tooth.....*Chlorosmia* n.g., 2050, *fulgida*, Cr.
British Columbia.
Black.....10.
10. Terminal antennal joint much narrowed and modified into a curved spine, flagellum widely and shallowly channelled behind, scape dilated *Alcidamea* Cr.
Terminal antennal joint not much narrowed, not modified into a spine.....11.
11. Ventral segment 2 with a large tooth, segment 1 with median impressed line at base, segment 7 pointed, compressed, excavated.....*Autochelostoma*, n.g., 2059, *canadensis*, n.sp.
.....Ottawa (?), 14, VIII.
One specimen, Br. Germain, 1914.
Ventral segment 2 without large tooth.....12.
12. Antennæ distorted, joints 4 to 7 wider than long and bearing bristles, joints 10 to 13 longer than wide, ventral segment 1 bluntly pointed.....*Andronicus* Cr., 2053, *cylindricus*, Cr.

Toronto, Ottawa, 6, VI.

Antennæ simple, ventral segments 1 and 2 with median apical spine, coat somewhat long.

Monumetha Cr., 2047, *argentifrons* Cr. (—*albifrons* Kirby).

Ontario to British Columbia, Ottawa, 6, VI.

13. Pollen brush black.....14.
 Pollen brush white.....15.
 14. Brilliant metallic green.....*Chlorosmia*, 2056, *fulgida* Cr.
 British Columbia.

Skin entirely black, abdomen black-haired, with lateral apical hair patch on segment 1, narrowing on the following segments

.....*Monumetha*, 2048, *argentifrons* Cr. (= *borealis* Cr.).

Ontario to British Columbia, Ottawa, VI.

15. Mandibles very large, head wider than thorax, upper part of clypeus with longitudinal median impression, lower part with large upstanding tooth, a low longitudinal carina between antennæ, first recurrent and first transverse cubital nervures interstitial, labrum long and sheathlike, much longer than wide, maxillary palpi three-jointed, labial palpi four-jointed, the 3rd and 4th joints not divergent, 4th as wide as long, wider than 3rd, 3rd joint pale, 4th dark; insect scantily clothed with whitish hair, which forms narrow apical fringes on segments 2 to 4, and on sides of segment 1, length 8 to 9 mm*Formicapis* n.g., 2055, *clypeala* n.sp.

Aweme, Man., 6, VII.—One specimen, N. Criddle, 1915.

Waterhole, Alta., 18, VIII.—One specimen, E. H. Strickland, 1915.

Head no wider than thorax, clypeus normal.....16.

16. Larger, length 10 to 12 mm., clypeus not more coarsely punctured than vertex, length of cubital nervure between first transverse cubital and first discoidal much longer than half that of the first transverse cubital nervure, pollen brush yellowish, mandibles 4-dentate.

.....*Andronicus*, 2054, *cylindricus* Cr.

Nova Scotia to Manitoba, VI, VII.

Smaller, length 7 to 8 mm., clypeus more coarsely punctured than vertex, cubital nervure between first transverse cubital

and first discoidal about half the length of first transverse cubital nervure, pollen brush white, mandibles 3-dentate.

.....*Alcidamea*, 2052, *simplex* Cr. (= *producta* Cr.).

Throughout settled part of Canada.

17. Eyes not hairy, ♀ with pollen brush, ♂ has on dorsal segment 6 a high transverse ridge, or crest, which forms the apex of abdomen, mandibles in ♂ with a large tooth

beneath *Megachile*, Lat.

Eyes hairy, ♀ without pollen brush, tip of abdomen of ♂ spinose, of ♀ acuminate.....*Caelioxys*, Lat.

NOTE.—The author submitted the above paper to Prof. T. D. A. Cockerell, who made some suggestions, most of which have been adopted.

SOME BEES IN THE BRITISH MUSEUM.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Andrena (*Opandrena*) *ricardonis* sp. n.

♂.—Length 9 mm; black, the clypeus lemon yellow with two black spots; hair of face, front and thoracic dorsum long and fulvous, of cheeks and underside of thorax pallid but not white; head broader than thorax; cheeks very broad, shining, obtusely subangulate below level of middle of eye; malar space almost obsolete; mandibles long, but not so much produced at end as in *A. flavoclypeata*; yellow clypeus higher in proportion to its width than in *flavoclypeata*, the yellow not approaching eyes at sides; front dull, sides of vertex shining; antennæ long, third joint longer than fourth, but not nearly as long as four and five combined; flagellum light fulvous beneath; disc of mesothorax and scutellum shining, with very sparse and minute punctures; area of metathorax small, triangular, rugose, the apical part smoother but not polished; tegulæ dark reddish; wings greyish, stigma rather small, dull amber, nervures dusky testaceous; b. n. meeting t. m.; second s. m. narrow, receiving first r. n. near its end; first t. c. not near stigma; legs slender, with hind margin of hind tibiæ, and all the tarsi, ferruginous; abdomen shining, with only very indistinct piliferous punctures, hind margins of second and following segments with

narrow ochreous hair bands, interrupted on second; apical plate (eighth ventral) broadly truncate.

Hab.—Vernon, British Columbia, June 9, 1902 (*Miss Ricardo*); British Museum. Allied to *A. trevoris* Ckll., but distinct by the colour of the antennæ and pubescence; possibly, however, a subspecies.

At Shorts Point, Okanagan Lake, B. C., June 28, 1902, Miss Ricardo took *A. medionitens* Ckll., a form with the abdominal hair bands clear white.

***Nomada vicinalis aldrichi* Ckll.**

Male.—Vernon, B. C., May 15, 1902 (*Miss Ricardo*), Brit. Museum. New to British America.

***Nomada illinoensis* Rob.**

Male.—Boston, Mass., Brit. Museum.

***Nomada custeriana* Ckll.**

Male.—West Cliff, Colo., May 19, 1889, (*Cockerell*), Brit. Museum. The specimen still carries my number 9, which shows that it is one of two specimens captured; the other, determined by Ashmead as *N. parata*, is in the U. S. National Museum, and is the type of *N. custeriana*. The species has not been collected since.

***Nomada vernonensis* sp. n.**

♂.—Length about 9 mm; robust, the head and thorax dull and rough (the face somewhat glistening), with erect dull white hair; head broad, vertex elevated, eyes pale grey; head and thorax black (with no red), the thorax with tubercles yellow, but no other light markings; mandibles (except rufous ends, which are simple), labrum (which has an apical patch of hair, but no tooth), band on lower margin of clypeus (narrowest in middle), and narrow lateral facemarks (shaped like the head and slender neck of a bird, upside down, ending narrowly but abruptly about level of antennæ), all bright yellow; posterior orbits wholly black; antennæ long, robust, not denticulate, third joint conspicuously shorter than fourth, but much more than half its length; scape black and red, hardly swollen; flagellum bright ferruginous, the basal half heavily

marked with black above; area of metathorax rugose, but apically with a pair of shining bosses; tegulae large, pale testaceous, black at base, and with a yellow mark posteriorly; wings clear, with a brownish apical cloud; stigma and nervures ferruginous; b. n. going well basad of t. m.; second s. m. extremely broad, receiving first r. n. far beyond middle; third s. m. above about half as broad as second; tibiae and tarsi bright red, the anterior and middle tibiae with a black spot behind; anterior and middle femora red, largely black beneath and at base; hind femora black, with apex and more than apical half above black; abdomen clear ferruginous; first segment with basal half black except a V-shaped red mark in middle; band on first segment, notched in middle, extremely large but widely separated patches on second, large patches on third (pointed and approaching in middle), and bands on 4 to 6, bright yellow, the bands enclosing or nearly enclosing red spots at sides posteriorly; apical plate notched; venter red, with a large deeply bilobed black basal patch, and a small yellow spot beyond middle.

Hab.—Vernon, British Columbia, April 15, 1902 (*Miss Ricardo*), Brit. Museum. A relative of *N. illinoensis* Rob., but much larger, and with the abdomen richly coloured. In the table of Rocky Mountain species it runs to 47, but is not related to the species there indicated.

SOME NORTHERN GEORGIA ACRIDIIDÆ.*

BY H. A. ALLARD, BUREAU OF PLANT INDUSTRY, WASHINGTON, D. C.

Of the musical Orthoptera, the Acridiidae in many respects represent a less highly specialized group. Their limited musical abilities, at least, would rank them far below the more highly specialized and musical Locustidae and Gryllidae. At best, their stridulations are hardly more than a brief lisping, or a noisy crepitation. Some of the Acridiidae while at rest produce, at intervals, a few monotonous lisplings by sawing the hind femora

*Mr. A. N. Caudell, of the U. S. National Museum, has kindly attended to the identification or verification of all Orthoptera collected and listed in this paper.
August, 1916

against the edges of the folded tegmina. Others are capable of stridulating only during flight, and produce a noisy clatter which is anything but musical. Members of the Acridiidae are strictly creatures of the sunlight and with darkness all become inactive and silent. I have never yet heard the note of any Acridian after darkness has set in. These interesting grasshoppers are also almost strictly terrestrial, and generally prefer open fields and pastures where they can find an abundance of bright sunshine and unlimited room for their noisy aerial performances.

Whatever the true significance may be, the predominance of green, brown and black in the coloration of the Acridiidae seems to indicate that these colours may have a more or less protective value. The brighter colours, which may be very beautifully patterned, are usually confined to the thin, parchment-like under wings, and are thoroughly concealed by the tegmina when the insect is at rest.

Among the Acridiidae there are many species which possess no powers of stridulation. Notwithstanding this, these insects in many other ways are very interesting. Smallest of all the Acridiidae and among the most interesting are the odd-shaped grouse-locusts. These tiny creatures, which leap almost as actively as fleas, are exceedingly difficult to discern in their natural environment of earth and dead vegetation. As one sweeps a net over the surface of the dry leaves in the woods there is an audible rustling as the tiny creatures hop about very much like tiny toads. At rest, their odd little bodies and sombre hues of greys, yellows and browns assimilate them perfectly with the mottled carpet of dried leaves, grasses, pebbles, bits of dead bark and woods among which they dwell.

Most of the Acridiidae mentioned in this paper were observed in the vicinity of a small settlement in Jackson County known as Thompson's Mills, and situated about five miles west of Hoschton, near the intersection of the counties of Hall, Gwinnett and Jackson.

Tettix arenosus Burm. This grouse-locust is probably a common species at Thompson's Mills. It is found among dry leaves in upland woods.

Tettix hancocki var. *abbreviatus* Hancock. This sombre-hued

little insect is common in the short grass of dry, upland pastures at Thompson's Mills. Such localities are more or less interspersed with young pines. Here I have found only the form with the short pronotum (*abbreviatus*). These grasshoppers are strictly terrestrial, and leap about in the short, scanty grass where their dull colours and mottled patterns make them very inconspicuous. These insects appear to be without stridulatory powers.

Tettigidea lateralis Burm. This grouse-locust is considerably larger than the preceding, and is not uncommon at Thompson's Mills. It occurs in the short grass of dry, upland fields and pastures in late summer in company with the preceding species. The var. *polymorpha*, Burm., occurs in similar situations.

Paratettix cucullatus Burm. Among leaves on sunny, thinly wooded slopes and banks near brooks, etc. Probably common at Thompson's Mills.

Nomotettix compressus Morse. Probably common at Thompson's Mills. It occurs on banks, in pastures, open woods, etc.

Neotettix rotundifrons Hancock. In upland pastures and sunny, thickly wooded hillsides.

Tryxalis brevicornis (L). This somewhat cone-headed Acridian seems to be locally distributed and not common at Thompson's Mills. I found it in only one locality among some rank meadow grasses bordering a small stream. Here only a few individuals were observed and these were exceedingly difficult to approach or capture, owing to their shy habits and rapid flight. No note has been observed for this species.

Eritettix carinatus Scudd. I first met this little Acridian early in April at Thompson's Mills, in an old pasture grown up to broom grass. It does not appear to be common in this locality. It keeps well down in the grass, moving about occasionally to stridulate. If it leaps and alights near the top of a grass stalk, it moves backward down the stalk until near the ground. Its notes are faint, lisping phrases of a few seconds duration, and are at intervals repeated six or eight times in quick succession: sic-a-sic-a-sic-a-sic-a-sic—sic-a-sic-a-sic-a-sic—sic-a-sic-a-sic-a-sic-a-sic. This grasshopper is most active when the sun is shining. Its notes resemble those of *Stenobothrus curtipennis* very much,

and are produced in the same manner by sawing both thighs simultaneously upon the edges of the tegmina.

Orphulella pratorum Scudder. In dry fields and pastures in upland situations, Thompson's Mills. I have recognized no stridulation for this grasshopper.

Chortophaga viridifasciata De Geer. This dimorphic species is exceedingly common at Thompson's Mills, and is the earliest to appear in March. It is generally distributed, being found in alfalfa fields, dry pastures, etc. The brown form, *infusca*, is equally abundant. The notes of this insect are a noisy crackling produced during flight.

Hippiscus rugosus Scudder. Very common in dry pastures and old fields at Thompson's Mills. A most clumsy, inactive locust and readily captured. It seems to have no distinct stridulation.

Dissosteira carolina L. This widely distributed grasshopper is a very common one at Thompson's Mills. It shows everywhere a preference for the bare soil of roadsides and fields. In such situations its dull gray and brown mottlings make it almost appear a part of the naked soils upon which it alights. The notes of this grasshopper are most peculiar. It ascends a few feet above the ground and, hovering in mid-air for some seconds, flutters its wings and produces a continuous lisping note. This mid-air performance is quite distinct from the usual flights of this insect, which are nearly or quite noiseless.

Trimerotropis citrina Scudder. This insect is a common one at Thompson's Mills, preferring the bare soil of roadsides and cultivated fields as does *Dissosteira carolina*. I have recognized no note.

Schistocerca americana Drury. This is a common grasshopper at Thompson's Mills, occurring almost entirely in dry situations in the vegetation of fields and in weeds and cotton plants. It is a shy species, and possesses vigorous powers of flight. Except for a rustling of the ample, transparent wings during flight, it has no definite stridulation.

Schistocerca alutacea Harris is less common than the preceding. It prefers the tall weeds and grasses of old fields. Its flight, like

that of the preceding, is vigorous and unaccompanied by any definite notes or stridulation.

Schistocerca damnifica Saussure. A common grasshopper at Thompson's Mills, occurring in upland fields and along roads. It is especially common in cotton fields. Unlike the two preceding species of this genus, which usually rest upon weeds or other vegetation, this species prefers to rest upon the bare earth. If frightened, it flies away silently and then may alight upon cotton or other plants. It seems to have no note. The almost uniformly reddish-brown colour of *Schistocerca damnifica* makes it quite indistinguishable from the red-land soils of northern Georgia. This insect appears rather late in summer.

Melanoplus scudderi Uhler. In early October, 1910, I found this short-winged grasshopper very common in the short grass and leaves in thin woods in certain dry, upland situations. At first sight one is ready to consider it only a nymph from its almost wingless appearance. It is an active insect and leaps readily when disturbed. Its dark gray and brown coloration make it very inconspicuous among the leaves, sticks and bogs of its native environment. It does not appear to be an open field species in this locality. Here its abundance seems to be very variable with different seasons.

Melanoplus femoratus Burm. Not uncommon at Thompson's Mills, in old fields. I have recognized no note.

Melanoplus atlantis Riley. This grasshopper is a very common species at Thompson's Mills, occurring in all upland fields and pastures, together with *Melanoplus femur-rubrum*, De Geer. I have observed no stridulation.

Melanoplus punctulatus Scudder. A very common species in all upland fields at Thompson's Mills, together with *M. femur-rubrum*. I have identified no note which it may produce.

Melanoplus femur-rubrum De Geer. An exceedingly common grasshopper at Thompson's Mills, in all upland situations, but especially so in grassy pastures. Its flight is noiseless and I have noted no stridulations while at rest. Scudder says he has seen the male sawing on its tegmina with its femur, but could detect no noise.

Syrbula admirabilis Uhler is also a very common Acridian at Thompson's Mills, especially in the dry fields grown up to broom grass. The male is rather musical, producing a weak, lisping stridulation at intervals—s-s-s—s-s-s-s-s-s, by sawing the hind femur upon the edges of the tegmina.

Arphia xanthoptera Burm. A common locust in old fields at Thompson's Mills. The notes are a loud, harsh crackling, accompanying their flights across the fields.

Arphia sulphurea Fabr. In fields, pastures, etc. A noisy crepitation during flight is the only method of stridulation.

Spharagemon bolli Scudder. Very common in old fields at Thompson's Mills and in pastures. It has been observed that this grasshopper sometimes hovers in air and produces a rustling note similar to the habit of *Dissosteira carolina*, but I have not witnessed this myself. The usual note is a rattling noise during flight.

The Acridiidae confine their habitat almost entirely to the ground stratum, whether in wood or in field. Few species regularly prefer the true herbage or shrub stratum of vegetation, as do many members of the Locustidae and Gryllidae. Even those species which appear to prefer wooded situations confine themselves to the more open, sparsely grassy areas as *Melanoplus scudderi* and some of the Tettiginae. I have found no species inhabiting deep woods where the ground is hidden with dense herbage. Orthoptera of all kinds are uncommon in such situations.

Tryxalis brevicornis perhaps belongs more strictly to the true herbage stratum of vegetation than any other species listed in this paper.

The species of *Schistocerca*, i. e., *americana*, *alutacea* and *damnifica*, do not confine themselves strictly to the ground stratum, nor can they be considered truly members of the herb and shrub strata. They are somewhat elastic in their habits, however, and show a more marked tendency to choose the habitat of the higher leaf and shrub strata occasionally, than do most Acridiidae.

This does not by any means complete the list of Acridians probably occurring at Thompson's Mills, but many years of patient study and collecting must be pursued to determine the Orthoptera inhabiting any region, and to become familiar with their habits and stridulations.

A REVIEW OF THE PTEROCOMMINI (APHIDIDÆ HOM.).

BY A. C. BAKER, WASHINGTON, D.C.*

A few years ago the writer undertook a study of the Pterocommini. In this he was helped, in her usual generous manner, by Doctor Patch, who sent slides of some different species, and by Professor Gillette, who loaned the writer slides of the specimens he had. The recent paper by Wilson (1915) on this tribe has called the writer's attention again to the species. It seems worth while, therefore, to publish a few notes on the group, since the writer's study showed some points at variance with the results published by Wilson, and since *Pterocomma populifoliæ* Fitch should be reinstated.

In regard to the genera, the writer believes Wilson's view correct, but in regard to species interpretation he is unable to agree with him. These points of difference will be noted under the species.

***Pterocomma populea* (Kalt.).**

Two American species are made synonyms of this by Wilson. They are *beulahensis* Ckll., and *rufulus* Davidson. *Rufulus* as indicated by specimens from Davidson is quite a different species. The cornicles of *populea* from Spandau, Prussia, are about equal in length to the hind tarsi. In *rufulus*, however, the cornicles are nearly twice the length of the hind tarsi, bearing about the same ratio as do those of *bicolor* Oest. Although *rufulus* proves to be distinct from *populea*, it becomes a synonym of *populifoliæ* Fitch, a species not mentioned by Wilson.

***Pterocomma populifoliæ* (Fitch).**

Populifoliæ was described in 1851, and Fitch's notes give the following numbers as representing the species: Nos. 6118-6121, Nos. 9292-9302 and No. 3712. These are Fitch's personal numbers; not the State Cabinet numbers. Of these numbers the following

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are now present in the National Museum collection: 9292, 9293, 9297, 9390 and 9301. A study of these specimens shows that *rufulus* agrees with *populifoliae* Fitch. Oestlund (1887) considered Fitch's species to be a Chaitophorus, and so described his *populifoliae*. Davis (1910) considered it an Aphis, and described another species under the name. Both of these writers expressed doubt as to their determination. In the writer's opinion, *populifoliae* stands as a good species, easily distinguished from *populea* by the relative lengths of the cornicles and tarsi.

The measurements for the alate viviparous female of this species average: Antennae III, 0.64 mm.; IV, 0.368 mm.; V, 0.336 mm.; VI, base and unguis (0.192 mm. + 0.288 mm.); cornicle, 0.352 mm.; hind tarsus, 0.24 mm.

Specimens taken on Popof Island, Alaska, and determined as *populea* by Pergande, are certainly *populifoliae*. Pergande concluded that both Kaltenbach and Koch were wrong in stating the cornicles of *populea* to be cylindrical, and he was of the opinion that, "in fact, they are clavate." So, indeed, they are in *populifoliae*, but the cornicles of *populea* are very plainly cylindrical, and in this regard Koch's figure is excellent and the descriptions of Kaltenbach and Koch exact. The Pergande Alaska specimens, now in the collection of the Bureau of Entomology, show the following measurements for the alate viviparous female: Antennae III 0.656 mm.; IV, 0.4 mm.; V, 0.384 mm.; VI (0.208 + 0.384 mm.); cornicles, 0.38 mm.; hind tarsus, 0.25 mm.

It will be seen that these measurements agree almost exactly with those given by Wilson for *populea*. But he gives no measurements of the hind tarsus. It will be seen also that these specimens agree with *populifoliae* Fitch, and it is the writer's opinion that the specimens measured by Wilson were specimens of *populifoliae* Fitch. Specimens of American *populea* show that species to be very different from *populifoliae*. This is most apparent in comparing the cornicles and hind tarsi. Measurements for the alate viviparous female of this species are as follows: Antennae III, 0.608 mm.; IV, 0.256 mm.; V, 0.24 mm.; VI (0.128 mm. + 0.144 mm.); cornicles, 0.192 mm.; hind tarsus, 0.192 mm. These figures indicate clearly the striking difference between the two species.

Now specimens of *populea* from Europe agree exactly in measurements, etc., with American specimens, excepting that the unguis of segment VI is very slightly longer. Moreover, the examples of both species have a much more cylindrical cornicle than have the specimens of *populifoliae*. The writer is therefore considering these American specimens to be *populea*. The European examples have segment VI usually about (0.128 mm. + 0.17 mm.).

In regard to *pilosa* Buckton, the writer has never had an opportunity to study forms supposed to be this species. From the description given by Buckton, it would seem very much as if he had two species before him. His apterous forms would very well agree with *populea*, whereas his alate form seems to be *populifoliae*, or a species near it. This will be seen from the measurements he gives for the cornicles in the two forms. Since Pergande, who had seen the type, placed *pilosa* as perhaps the same as his *populea*, this would also tend to indicate that Buckton's alate form is *populifoliae* Fitch.

Pterocomma beulahensis (Ckll.).

The measurements given for this species by Cockerell would make it very difficult to include it under *populea*. It has, however, the cornicles about equal in length to the hind tarsi. The type slide of the species is now in the National Museum collection, and on it are mounted four alate specimens. These show some variation in the sixth antennal segment. One antenna measures for (0.176 mm. + 0.336 mm.), and one (0.16 mm. + 0.32 mm.). It will be seen that this proportion is very different from that of *populea*. A more prominent character, however, is met with in the beak. In all our specimens of *populea* the beak is long, reaching beyond the hind coxæ, sometimes even to the base of the cornicles, or very near them. The beak in *beulahensis* is much shorter, extending hardly to the hind coxæ, sometimes not reaching them. The cornicles are somewhat swollen, a character which is not so evident in *populea*. Moreover, *beulahensis* is more elongate, having the general look of *populifoliae*, whereas *populea* has a shorter, "bulkier" appearance.

Pterocomma salicis (L.).

Under this species Wilson discusses the forms determined as *salicis* L. in this country. He concludes that the species does not occur here, and considers the cornicle the distinguishing character. While the cornicles figured by him are very distinct, the writer has examined both American and European specimens in which the cornicles are almost identical. They are not only the same in shape, but the measurements are the same, and a range in variation between the two types is met with in European material. It is not probable that two European species are confused since the variation was seen in aphides collected from one colony in France. Another point of resemblance is the bright orange colour of the cornicles in both European and American forms. It is true that the cornicles of American forms seldom show the distinct bulging met with in *salicis*, but with the variation in the European form, and with the two forms showing the same measurements, it seems hardly possible to separate them on this character of the cornicles. Both European and American forms, moreover, show a more or less distinct dusky bordering to the wing veins.

In an attempt to find some other character to back up the variation in the European cornicle and so to separate the American form, the writer has measured a large series of apterous forms. These have shown no differences. The European form shows more variation in the antennal segments, the third segment particularly being sometimes longer in the European than in the American form. In others, however, they are exactly the same, and this is more often the case than otherwise. This variation in the antennal segments does not seem to be, therefore, any definite character upon which the two species can be separated with certainty. In the meantime, therefore, the writer prefers to hold *salicis* for the American forms.

Measurements of the alate viviparous female of both American and European specimens will show their remarkable similarity in this respect.

European: Antennæ III, 0.72 mm.; IV, 0.464 mm.; V, 0.432 mm.; VI, (0.224 mm.+0.224 mm.); cornicle, 0.56 mm.; hind tarsus, 0.256 mm,

American: Antennæ III, 0.7 mm.; IV, 0.448 mm.; V, 0.384 mm.; VI, (0.208 mm.+0.224 mm.); cornicle, 0.544 mm.; hind tarsus, 0.24 mm.

It will be seen from these measurements that the European and American forms are the same as far as proportions are concerned, and considering the great variation met with in the cornicles of the European, and even of the American examples, there does not seem sufficient basis in the writer's opinion for keeping the species distinct. Certainly the two forms are much more nearly alike than are the American form and *bicolor* Oestlund.

Pterocomma bicolor (Oest.)

The American specimens listed under this species by Wilson do not, the writer believes, belong here. Oestlund gives the length of cornicles as 0.35 mm., whereas Wilson gives them as 0.59 mm.; fully equal to those of *salicis*. The following measurements of the alate viviparous female made from specimens of *bicolor* collected by the writer in Ontario show that Wilson's *bicolor* measurements refer not to this species at all, but perhaps to variations of *salicis*? The cornicles of *bicolor* are quite distinctive and the same as given by Oestlund in his description.

Measurements of alate viviparous female: Antennæ III, 0.672; IV, 0.38 mm.; V, 0.36 mm.; VI, (0.16 mm.+0.352 mm.); cornicles, 0.352 mm.; hind tarsus, 0.22 mm.

It will be seen that this species is separated from *populifoliae* by the proportions of segment VI of the antenna. The base is much shorter and the unguis much longer than in Fitch's species. This character may not be a constant one, and in such case *bicolor* will become a synonym. In the National Museum collection there are specimens determined as *bicolor* by Williams. According to Davis (1911) this determination has been confirmed by Oestlund. Williams' specimens in the collection are certainly *populifoliae*. The measurements of segment VI, of the two alate specimens present are (0.176 mm.+0.288 mm.) and (0.176 mm.+0.27 mm.). Comparing these with measurements of one specimen in Fitch's collection, which measures (0.144 mm.+0.256 mm.), we see that

there is little difference in proportions. The Ontario material collected on the Karwatha Lakes is uniformly different from this, averaging as previously given (0.16 mm.+0.352 mm.). One specimen had the measurements (0.16 mm.+0.384 mm.) and one (0.176 mm.+0.352 mm.). These measurements agree in proportion with those given by Oestlund, and the writer, therefore, prefers to hold *bicolor* as distinct on this basis until large collections can be made and studied.

In regard to the species *flocculosa* Weed, *smithiae* Mon., and *salicti* Harris, no remarks will here be made, since these species are fully dealt with by Wilson, and the writer has examined some of Weed's specimens, but a species described by Patch (1913) as *antennatum* should be mentioned. It cannot be definitely described in full until alate forms have been found. Another species has been described as *farinosus* by Del Guercio (1913). In this species the cornicles are cylindrical, but very much longer proportionately than those of *populea*.

Pterocomma steinheili (Mordwilko)

A third species, not mentioned by Wilson, is one named *steinheili* by Mordwilko. Through the kindness of Mr. J. J. Davis, I have been able to examine a slide of specimens received by him from Mordwilko. One alate form and several apterous ones are present. The species is very close indeed to *beulahensis* Ckll., and it is the writer's belief that the two are identical. There is one marked difference, however, between the alate specimen of *steinheili* and those of *beulahensis*. The lateral tubercles of the abdomen of *steinheili* are nearly twice the size of those of *beulahensis*. It is quite probable that this is a variable character and that the two species cannot be separated by means of it. Since, however, only one specimen of the alate form of *steinheili* is available for study, it is necessary on this basis to keep them distinct.

Measurements of the alate viviparous female: Antennae III, 0.432 mm.; IV, 0.288 mm.; V, 0.32 mm.; VI (0.16 mm + 0.272 mm.). Cornicle, 0.256 mm.; hind tarsus, 0.224 mm.

This will then leave the species as follows:

Pterocomma populea (Kalt.)

Synonymy: *Aphis populea* Kaltenbach.
Cladobius populeus (Kalt) Koch.
Pterocomma pilosa Buckton (apterous form).

Pterocomma farinosa (Del Guercio).

Synonymy: *Cladobius farinosus* Del Guercio.

Pterocomma steinheili (Mordwilko).

Synonymy: *Cladobius steinheili* Mordwilko.

Pterocomma salicis (L).

Synonymy: *Aphis salicis* Linne.
Melanoxanthus salicis (L) Buckton, Weed, etc.
Melanoxantherium salicis (L) Schouteden.
Pterocomma salicis (L) Wilson.
? *Pterocomma bicolor* Wilson, not Oestlund.

Pterocomma populifoliae (Fitch).

Synonymy: *Aphis populifoliae* Fitch.
Pterocomma pilosa Buckton (alate form).
Cladobius populeus Pergande, not Kalt.
Cladobius rufulus Davidson.
Melanoxanthus bicolor Williams, not Oestlund.
Melanoxantherium rufulum (Davidson) Essig.
Pterocomma populea Wilson, not Kalt.
? *Melanoxantherium salicti* Patch.
Cladobius beulahensis Wilson, not Cockerell.

Pterocomma flocculosa (Weed).

Synonymy: *Melanoxanthus flocculosus* Weed.
Melanoxantherium flocculosum (Weed) Schouteden
Pterocomma flocculosa (Weed) Wilson.

Pterocomma smithiæ (Mon.).

- Synonymy: ? *Aphis salicti* Harris.
? *Aphis salicicola* Uhler.
Chaitophorus smithiæ Monell.
? *Lachnus salicicola* (Uhler) Thos.
Melanoxanthus salicti Weed.
Melanoxantherium smithiæ (Mon.) Gillette.
Pterocomma smithiæ (Mon.) Wilson.

Pterocomma bicolor (Oest.)

- Synonymy: *Melanoxanthus bicolor* Oestlund.
Melanoxantherium bicolor (Oestlund) Patch.

Pterocomma antennata (Patch)

- Synonymy: *Melanoxantherium antennatum* Patch.

Pterocomma beulahensis (Ckll.)

- Synonymy: *Cladobius beulahensis* Ckll.

A few misprints are noted in Wilson's paper. On page 347, in listing the described species, *beulahensis* and *salicicola* are misspelled. Cockerell, the author of *beulahensis*, is written as if it were part of the specific name. The citation of "*lanthanæ*" is different on page 347 from the citation of the species on page 357. If *lantana* Koch is not a *Pterocomma*, as Wilson believes, and if the name is retained as he retains it, it must become *P. lantana* (Pass) based on the description of the oviparous female in *Aphididæ Italicæ*, p. 55. Passerini spelled the name *lantana*, but a new one would be required,

The names listed under *salicis* (Linn.) should be altered as follows: *Aphis salicis* should be in italics. In the lines following, Linn. should be in parenthesis, while the names of the other authors should not be. In the synonymy of *flocculosa* Weed, the first reference should read *Melanoxanthus*, and Weed should not be in parenthesis. In the synonymy of *bicolor* Oest, where the genus is cited as *Melanoxanthus*, Oestlund should not be in parenthesis.

In the synonymy of *populea* Kalt., the third reference, *Cladobius* should be omitted and Kalt. inserted in parenthesis after *populeus*. Whether or not the word was written thus, and not *Cladobius*, I have been unable to prove. The first edition of Passerini's *Gli Afidi* was published in 1857. I have not been able to see this nor the 1860 Parma edition. Wilson's reference, however, is incorrectly written. So also is his reference to *Aphididæ Italica*, 1863. *Pilosa* Buckton is cited twice. In the second citation it is indicated that the species was not described as a *Pterocomma*, but was referred to that genus by Wilson. In writing the name *populea* in connection with *Pterocomma*, Kalt. should be in parenthesis.

On page 355 *Aphis salicis* Harris is discussed. This is a misprint for *salicti* Harris, named on page 191 of the first edition of Harris' work. The same is seen in the citation of Oestlund, etc. In listing *smithiæ* as a *Pterocomma*, Monell, which is incorrectly spelled, should be in parenthesis.

In the list of species on page 347, the genera in which they were originally described are placed in parenthesis between *Pterocomma* and the specific name. This is the method given in the international code for the indication of subgenera.

All of these little details are very minor matters, but they are here mentioned for purposes of reference.

KEY TO THE SPECIES OF PTEROCOMMA

1. Cornicles without a distal flange and abruptly constricted at the distal extremity.....*flocculosa*.
 Cornicles with a distal flange and not so abruptly constricted at their distal extremities.....2.
2. Cornicles about twice as long as their greatest diameter *smithiæ*.
 Cornicles much more than twice as long as their greatest diameter....3.
3. Cornicles about equal in length to the hind tarsi.....4.
 Cornicles much longer than the hind tarsi.....6.
4. Beak reaching to the cornicles or nearly to them.....*populea*.
 Beak reaching only to the hind coxæ or not quite to them.....5.

5. Lateral tubercles of the abdomen about equal in length to the second antennal segment.....*steinheili*.
- Lateral tubercles of abdomen considerably shorter than the second antennal segment.....*beulahensis*.
6. Cornicles nearly twice as long as the hind tarsi.....7.
- Cornicles much more than twice as long as the hind tarsi.....8.
7. Unguis of segment VI of antennæ about equal in length to the cornicle and more than twice as long as base.....*bicolor*.
- Unguis of segment VI of antennæ usually shorter than the cornicle and less than twice as long as base.....*populifoliae*.
8. Cornicles cylindrical or slightly tapering.....*farinosa*.
- Cornicles much swollen in the middle.....9.
9. Cornicles bright orange in colour.....*salicis*.

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1913. Patch, E. M.—Aphid Pests of Maine—The Willow Family—Bull. Agr. Exp. Station, Me. No. 213., p. 89.
1913. Del Guercio, G.—Generi e Speci Nuove di Afididi—Redia IX, p. 178.
1915. Wilson, H. F.—A Synopsis of the Aphid Tribe Pterocommini—In Annals of the Ent. Soc. of America, Vol. VIII, p. 347.

The remaining literature on the tribe is cited in Wilson's paper.

A NEW NOCTUID GENUS.

BY WM. BARNES, M.D., AND J. MCDUNNOUGH, PH.D., DECATUR, ILL.

The publication by Dr. Skinner (Ent. News, 1902, XIII, 141) of the species *Psychophora fasciata*, from Alaska, evoked considerable discussion at the time regarding the position of the species (whether a Noctuid or Geometrid), and also concerning the genus *Psychophora* Kirby and its type *sabini* Kirby (Ent. News, 1902 XIII, 191; l. c. 1903, XIV, 193). In the latter paper Dr. Dyar, in the belief that *fasciata* corresponds closely to the generic characters given for *Psychophora*, leaves the species along with *sabini* in that genus, and creates the genus *Skinneria* for *frigidaria* Gn., which he considered wrongly associated with *sabini* Kirby.

In the 4th Volume of Seitz Macrolepidoptera Palæarctica (Geometridæ) Mr. Prout (p. 232) sinks *Skinneria* to *Psychophora*, placing *frigidaria* Gn. in this genus. In reply to a query of ours regarding this action, he has kindly replied that there is a series of specimens under the name *sabini* in the British Museum from Grinnell Land, which "agree so perfectly with Curtis (and well with Kirby) that one cannot hesitate as to the rightness of their determination, especially as the localities are in the same main geographical region, and there is no knowledge of any rival claimant from thence." He further states that *frigidaria* Gn. from Norway, Lapland, etc., "seems evidently a mere local race of *sabini*," but that *phocata* Moesch, according to the figure, is a distinct but closely allied species. All these species he considers to be typical Larentiids. Regarding *fasciata* Skin. he was unable to speak definitely, as he had no material of this species.

The above remarks led us to examine more closely our specimens of *fasciata*, of which we have four ♂'s from the type locality, two of them being co-types. We find that Dr. Dyar in his otherwise excellent characterization of the generic characters of *fasciata* (Ent. News XIV, 194) has overlooked the fact that the mid and hind tibiæ are well spined. This fact would almost with certainty prove the species to be a Noctuid, and it would fall into the family *Agrotinæ* of Hampson, which reference would be further supported by other structural characters, notably the obsolescence of vein 5 on the secondaries from near the middle of the cell. With regard

to the two characters which have led *fasciata* to be considered a Geometer, *viz.*, the fovea at base of primaries and vein 5 of primaries arising from the middle of the cell, we cannot accept either of these points. The so-called fovea is apparently caused by a distinct bifurcation of vein 1 at the base, the space thus included by veins 1 and 1c being somewhat devoid of scales, which in any case are rather sparse on the underside. Regarding vein 5, all our specimens show this vein *distinctly below* the middle of the cell, rather more distant, it is true, from 4 than is usual, but slightly curved downward towards 4 at the point of origin. The antennæ are, in our opinion, very strongly lamellate, giving practically the appearance of bipectinations; the eyes rather small and reniform.

As there is apparently no generic name available for the species, we would propose the name BARROVIA (the species being taken at Pt. Barrow) with type *fasciata* Skin., and would place the genus in the vicinity of *Agrotiphila* Grt., from which it differs by its unspined fore tibiæ and hairy vestiture.

For generic characteristics other than the above-mentioned, we would refer to Dr. Dyar's paper as already quoted.

BOOK REVIEW.

THE LIFE OF INLAND WATERS. An elementary text book of fresh water biology for American students. By James G. Needham, Professor of Limnology in Cornell University, and J. T. Lloyd, Instructor in Limnology in Cornell University. The Comstock Publishing Co., Ithaca, N. Y., 1916. 438 pp. Price, \$3.00.

This is a work that will appeal to many classes of readers, including entomologists working in various fields of special study. It deals with a subject of immense scope, which has been developed gradually through the accumulated researches of innumerable investigators and has only recently acquired the status of a coherent science.

The vast array of facts embodied in this literature has been thoroughly sifted and assimilated by the authors, and the result is an admirably planned and most attractive presentation of the elements of limnology or fresh-water biology.

After an interesting chapter on the history and development of this science, the authors discuss the physical and chemical properties of water, and of natural bodies of water, regarded as aquatic environments, and also the interrelations of land and water. This is followed by a general account of the various types of aquatic environments, under the sub-headings: "Lakes and Ponds," "Streams," and "Marshes, Swamps and Bogs."

The fourth and longest chapter deals with types of aquatic organisms, these being described briefly in untechnical language, particular attention being given to their mode of life and such features of form and structure as indicate their fitness for their particular environment.

This and the two following chapters, entitled "Adjustment to Conditions of Aquatic Life" and "Aquatic Societies," contain much entomological matter. The latter two chapters are of exceptional interest to the biologist, and it is doubtful if there is anywhere to be found a more admirable analysis of the ecological relations of fresh-water organisms.

In the concluding chapter, "Inland Water Culture," the subject is discussed from the economic standpoint, and the possibilities of utilizing the extensive areas of swamp and marsh in North America for intensive fish-culture are clearly demonstrated. Nor are the aesthetic and educational aspects of the subject forgotten, and the authors show their breadth of view in this connection in advocating the preservation of wet lands in part as sanctuaries for wild life.

Throughout the book it is the ecological point of view that is emphasized rather than the systematic and morphological, and from this standpoint there is much that is of great interest to students of all groups of aquatic insects.

The illustrations are numerous and attractive, many of them being reproductions of original photographs and photomicrographs. The chief defect is the somewhat large number of typographical errors, which will doubtless be corrected in a future edition.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A VISIT TO NIAGARA GLEN.

BY FRANCIS J. A. MORRIS, PETERBOROUGH, ONT.

After nearly all July sacrificed on the altar of one's profession, three solid weeks of our all too short Canadian summer gone up in smoke and stifling city heat—weeks, too, when every self-respecting entomologist should be clinging perilously at the very top of his bent—it was indeed high time for relaxation. I hurried feverishly down to the Yonge St. wharf and boarded a Niagara boat. I had told no one where I was going, least of all myself. My preparations were stealthy and the contents of my pilgrim's srip of the most meagre. In one pocket (had you picked it) you would have found a tooth-brush, a comb, a cyanide bottle, and two clean handkerchiefs; in another a small plant-press, made of two stout cardboard covers enclosing a dozen sheets of blotting paper, and carefully tied up with a pair of brown laces, borrowed for the nonce from my Sunday boots; in a third an empty tin of Colgate's shaving-stick (serving the double purpose of a drinking cup and a receptacle for larvæ and other specimens that required preserving alive), a compass, a chisel, and a pair of forceps; while in an inner pocket (defying the Artfullest Dodger to touch) — with perhaps an occasional roguish peep abroad bulged unabashed (or snuggled contentedly, according to your view of it) a negligé shirt, of a pattern much in vogue a decade or two ago, wrapped closely round a collapsible insect net.

It was already growing dusk when I was landed at Queens-ton village and reported at the quiet, old-fashioned boarding-house where my habits and hobbies being known were no longer subject to comment or disconcerting question. After making arrangements for a night or so's lodging and an early start next morning, I strolled out through the gathering dusk in the direction of the woods at the foot of Brock's monument; after turning a little way down a lane skirted by grapevines, I presently became

aware, on all sides, of tiny rustlings in the foliage, prelude to the drowsy hum and blundering flight of shard-borne beetles; a sound familiar enough, and one that should have surely set me down not more than two or three years or 100 miles away—in the school playground, say, Port Hope, at the height of the June-bug season; but there must have been something peculiar in the keynote of this symphony, for it set vibrating a far more distant chord of memory: a little tilt between the mind's deft fingers, one magic turn of the kaleidoscope we call imagination, and on the instant I found myself a schoolboy in a narrow Kentish lane between chestnut trees and hawthorns, watching at dusk for cockchafers and the occasional prize of a stagbeetle soaring out of the hedgerow. I had no net with me, and though I could tell the beetles were larger than June bugs, capture was out of the question, so I turned in for the night.

Next day I was heading towards the Heights before 6 a.m. For some time I stuck to the main road, for the dew was very heavy; but near the Monument Station I sensed unmistakably the neighborhood of a certain fungus, and following my nose like a questing hound, presently spied, by a clump of red cedar, a small colony of what I was in search of—*Ithyphallus impudicus*—"Stink-horns," to use the vulgar and all too expressive name. Two of the horns, already sinking into putrescence, were tenanted by nearly a score of silphids, dark-winged and with reddish margin on the thorax.

From here, as it was too early for the car-service, I tramped up the belt railway towards the Glen; the sides of the track showed plenty of New Jersey Tea, but it was too soon in the day for insect visitors; on some plants of purple vetch I found great numbers of "the old-fashioned Potato-beetle" (*Macrobasis unicolor*) feeding; and a couple of miles further up, when I was within a few rods of the Glen enclosure, it being after seven o'clock, with the sun hot and strong in its course, came gliding out towards me from the shrubbery that fringed the lip of the gorge, a magnificent yellow-banded snake, larger and stouter than any garter snake I had ever seen before; forward he drove with that wonderful motion that, unaided by limbs, yet rivals in grace and mastery of self-control the most perfect athlete's—rigidity and suppleness

combining to create a new and altogether unique form of energy. I stood between the tracks and watched his advance; strong enough, it looked, to overthrow quite a massive obstacle or thrust it aside, yet gently gliding about a blade of grass without bending it, or flowing like oil round the sides of a stone. Not the slightest notice of me did he take, but lay out along the sand within a foot of the rail and basked in the sun. I stepped over to that side of the track and looked down at him; first his head and neck, and then the markings on his back. There was something strange to my eye in the appearance of this garter snake; the broad zig-zag bands of yellow seemed unfamiliar; the colour itself was not the waspy straw yellow I was expecting, but darker in part, almost red-ocre, like a British hornet; I glanced at the tail: one, two, three, four, five naked joints; it was my first rattlesnake. Just then the rumble of an approaching car forced me to step from the tracks; I had no desire to be marooned for even a moment alone with a rattler on a narrow strip of cliff-edge, so I chose the other side of the right-of-way. As soon as the coast was clear, I returned to my scrutiny; the snake had not moved, though the car had lumbered by within a foot of him, out-rattling a thousand of his kind; but he was startled, probably by the vibration of the ground, and almost immediately slid back into the bushes and so (doubtless) down to the ravine. The keepers at the Glen had not seen one all the season and showed surprise, if not annoyance, that I had not killed this fellow. Snakes are none of them aggressive, but the rattler is, I believe, more than ordinarily sluggish; unless cornered or accidentally stepped upon or jostled, he is perfectly harmless, and in cold weather can be picked up and handled with impunity.

In the rich herbage beside one of the paths that led to the flight of wooden stairs I noticed numbers of little chrysomelians feeding, at least three species, two of them black with four yellow or reddish spots on the elytra (2 basal and 2 apical), one of the beetles proving *Bassareus* and the other *Cryptocephalus*; the third species was of a uniform dark-grey and quadrate in outline, apparently *Pachybrachys*.

I had now reached the Glen itself, and proceeded to hobnob for an hour or two with some old cronies among the ferns. It ap-

pears that when the Glen was Foster's Flats, it harboured a few plants of the Holly Fern (*Polystichum lonchitis*), and I had planned to hunt for this plant, first downstream away from all frequented paths, and then upstream towards the whirlpool. After three hours' unavailing search downstream, I descended towards the river bank for another spell of sunshine and entomology.

Here I came upon a thicket of undergrowth—black raspberries in profusion, a tangle of grapevines, clumps of elder, and a sprinkling of basswood. Halting beside one of these last, before wading into the thicket, I let my eye range over the foliage. Presently I saw a sight that set my heart beating, a pair of tiny longicorns basking on a leaf; it was ten years since I had seen the insect—*Eupogonius subarmatus*—and then, though I had captured the only two I saw, one on a basswood log and the other on a leaf overhead, I knew them for the wariest of their kind. Cautiously as I approached, my quarry dropped off the edge of their leaf before I could get within range. I had now little hope of success, for the insect was extremely small and the ground a miniature jungle of rank grass. I stood, however, and watched the place under the leaf very closely, devouring the ground inch by inch, and presently spied the pair resting on a flat slope of stone, and captured them both with little more ado.

Nothing else was to be seen about the lower ranks of foliage on this tree, but when I got round to the side next the sunken stretch of thicket, more basswoods appeared in the open; the raspberries and the rich drapery of sunlit green beckoned imperiously; I looked at my watch; eleven a.m. The hour was auspicious for sun worship—h-h-h-h-m, bz-z-z-z-z-m; hullo! I thought, service is just going to begin; here comes the clerk. It was *Pelidnota punctata* settling down on a grapevine, but very lively, and, what was more to the point, quite out of reach; indeed, he only stayed long enough to clear up the mystery of the night before and then make off. Without delay I stepped down into the thicket and, with an eye focussed for small creatures on grass and leaves, proceeded to range about this tangled river-glade.

There is a peculiar charm about moving cautiously through sun-lit spaces or standing at gaze like a pointer on the still hunt for tiny game in the all but breathless glare of July heat. It

takes a trained eye to render visible the sadder-hued and more sluggish forms of all this multitudinous insect life, but it was not long before I began to realize that the wilderness of my choice, so far from being a desert, was a thronging conventicle of fellow sun-worshippers. It was, I recall, while slowly poring over the surface of a tall and stately teasle, from the heart of a neighbouring berry patch, that I spied one of the first members of this congregation. At first I took it for a large yellow-and-brown-banded hymenopter, the velvety sheen of its elytra giving the effect of shimmering wings, but under the lens of my unwavering stare it soon steadied into the form of *Bellamira scalaris*, the first I had ever seen alive; unfortunately it had not come to stay through the service, for hardly had I shaken free from some clinging ropes of thimbleberry vine, than I saw the coveted object hurry to the edge of his perch and soar away into the air, translated from my gaze like some beatific vision into the empyreal vast. Possession is nine points of the law, but of entomology it seemed just then to a beetle-fancier the one and only point worth naming in his whole avocation.

My disappointment was quite keen and lasted for a long time; even now the recollection rouses a fresh pang, as an old wound will throb anew in bad weather. But other sights and better luck (both abundant that day) soon drove all this into the background. Before I left the thicket I had captured one specimen of *Oberea bimaculata* (resting, for a wonder, on the upper side of his raspberry leaf), one specimen of *Plagionotus speciosus*, and seven specimens of *Desmocerus palliatus*, always on the under side of the foliage of elder, usually early elder, whose blossom, long over, had been replaced by clusters of crimson berries. What a magnificent insect the Knotty Cloak is! with his gleaming wing-covers of Prussian blue based with bright yellow; unfortunately, his colours fade; cabinet specimens become actually dingy in the course of years, the yellow in particular losing all its vividness.

At the edge of the thicket, before emerging, I glanced up into a large basswood and noticed a pale yellow object apparently about the size of a cecropia moth depending from an upper leaf; it had not the thin, shrivelled serenity of dead foliage, but, whatever it was, it hardly bent the leaf or its stalk where it hung. Suddenly remembering that I had an insect net with a three-jointed handle

in my pocket, I drew it out and fitting it together scooped the enigma into the silken bag, where it writhed and struggled with moth-like flutterings; it was a tiny bat.

High up on the same tree I now spotted (in its favorite attitude) another specimen of *Eupogonius subarmatus* and conceived the happy idea of utilizing the creature's instinct of escape to secure its capture. It evidently loved to sit up on the spacious platform of a linden leaf and "take the sun"; when approached it would nearly always run (or roll) to the edge of its resting-place and drop over; all I had to do was to hold the net well under its perch and then jar the insect into activity. This went like clockwork, and I spent two or three hours in systematic search about bass-wood foliage. Blatchley does not mention the linden among the creature's food plants, but I took over a dozen specimens that day of *Eupogonius subarmatus*; they were all found basking on linden leaves, and, with a single exception, on being approached, they all launched themselves obligingly into the captivity of my insect net.

It was nearly three p.m. when I decided to make a trip beyond the paths, upstream, in search of the Holly Fern; I first made my way to the last drinking fountain in the Glen, a lovely cold spring that wells out from the base of a giant block of limestone. Here as I turned away refreshed, I saw dangling in an old spider's web—dead but undamaged, and surely a most unusual victim of those silken meshes—the large and handsome longicorn, *Tylonotus bimaculatus*, the only specimen I have ever taken.

From now on I was a botanist, and though I saw no signs of the Holly Fern, I had the good luck to find a little colony—three or four plants—of Ebony Spleenwort in a grove of hemlock and cedar. Altogether, it was with great reluctance and a fast-declining sun that at last I tore myself away from the Glen and took the car to the monument. Here I spent two hours searching for a wood where report had whispered to me of the Broad-leaved Beech Fern. It was, thus, already dusk when, in spite of the very doubtful clue, I brought my search to a successful close and returned to my lodgings, tired but determined to have one more look in the morning for the apocryphal and probably long extinct Holly Fern of Foster's Flats.

Next day, in order to leave lots of room for my pocket lunch as well as to compel constancy in my fern-search, I most foolishly burned my entomological boats by leaving my cyanide bottle behind. I spent all morning upstream working towards the whirlpool in a vain and tiring (or was it untiring?) search for *Polystichum lonchitis*, and at last about noon gave it up, went again to commune with my little colony of Ebony Spleenwort, and then began my homeward walk along the track.

Here I made a most exciting discovery: the New Jersey Tea blossoms, that early in the morning were quite untenanted and seemed to have lost their fragrance, were crowded with eager guests in the bright sunshine. There is no plant, in my experience, so attractive to beetles as *Ceanothus americana*, and I have a long list of its guests in the shape of captures made on its blossoms; these were mostly of the *Leptura* and *Typocerus* genera of Longicorn, but only a few days before I had added a new find among Scarabs, *Macrodactylus subspinosus*, just because the New Jersey Tea was in a new locality; and no matter how old and familiar a blossom is, I always search it carefully in hopes of new finds, if I am in a new district.

But alas! I had no collecting-bottle, nothing but a handkerchief and my Colgate's drinking cup. For some little time I made no discovery beyond a variety (or possibly a new species) of *Trichius*, and soon the four corners of my handkerchief were knotted over specimens of this beetle and the whole handkerchief was redolent of the strangely sweet—if pungent—scent the insect releases on capture—some of the tiger-beetles emit a similar volatile essence with the same sweet but searching odour.

I was about a mile from the Glen when I happened on the first new beetle banqueting in the Tea blossoms—not only a new species, but a new genus; its extremely attenuate outline could belong to nothing but *Strangalia*, and *Strangalia* it proved to be, *Strangalia luteicornis*. It was a happy entomologist, I can tell you, who fitted the stopper of his drinking-cup over that jejune little atomy, and a most unhappy entomologist who had to open the same a score of times and coax a new capture in before any of the inmates found an exit. Handling a basket of snakes, or driving a pig to market would be child's play to that problem. But though

I lost two or three of the entire bag, it was a great catch that I emptied out into my cyanide bottle as soon as I got home: three *Strangalia luteicornis*, four *Leptura subhamata* (all ♂), six *Leptura cordifera*, two *Leptura dehiscens*, and one *Toxotus cylindricollis*, besides not a few specimens of *Trichius*, *Typocerus* and *Leptura* that I had taken occasionally before.

Two days' sun-bath and about 30 hours of revelling among ferns, flowers and insects had made a new man of me, and now, as I lay down the pen with which I have tried to call out of the past the spirit of my trip, dipping deep in the ink-well of memory, it is my most ardent desire to repeat it all in the body next July, and following the lure of *Bellamira*, *Tylonotus*, or *Strangalia*, make one more rare new capture.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The 53rd Annual Meeting of the Society will be held at its headquarters in the Ontario Agricultural College, Guelph, on Thursday and Friday, November 2nd and 3rd, and will be presided over by Mr. Albert F. Winn, President (Westmount, P. Q.).

A popular lecture will be given on the Thursday evening in Massey Hall by Dr. L. O. Howard, Chief of the U. S. Bureau of Entomology, Washington, D. C.

It is hoped that the members of the Society will endeavour to be present. Subscribers to the "Canadian Entomologist" are cordially invited to attend and to present papers. Members and visitors will be entertained at luncheon in the College Dining Hall at the noon hour each day.

The Secretary will be greatly obliged if members and others will send him the titles of papers they wish to present (stating the length of time required for reading) as soon as they can, in order that the programme may be prepared in due time; it will also be a convenience if members and visitors will notify him a few days before the meeting of their intention to be present.

A. W. BAKER,
Secretary.

Ontario Agricultural College, Guelph.

SOME GENERIC GROUPS IN THE MALLOPHAGAN FAMILY MENOPONIDÆ.

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

The chief interest in the study of the Mallophaga lies in the problem of their distribution, which is beyond question fundamentally the problem of the relationships of their hosts. It has already been pointed out very clearly by Kellogg and Harrison

that the solution of the first problem may legitimately be used as an aid in the solution of the second; that the student of these parasites may possibly be able to throw some light upon certain questions of the answers to which the ornithologists are at present in doubt.

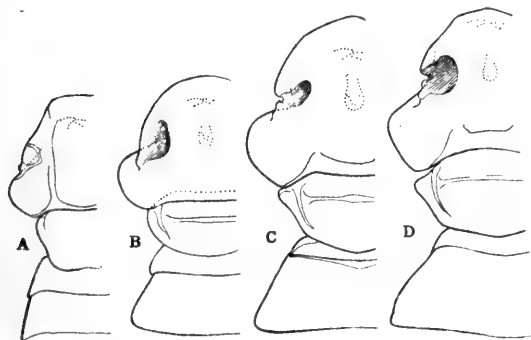


Fig. 10.—Outlines of one side of head of: A, *Dennyus distinctus*, n. s.p.; B, *Myrsidea diffusa* (Kell.); C, *Actornithophilus uniseriatus* (P); D, *Heleonomus miandrius* (Kell.).

However, before this happy end can be achieved, it is necessary that the classification of the Mallophaga themselves be placed upon a sound basis, something that, as it is becoming increasingly apparent, has not yet been accomplished. The generic groups that have in the past been recognized are entirely too broad adequately to express the needs of the situation. The old genera are for the most part really of family value, and many of them have quite recently been elevated to this rank; but the division of these unwieldy and complex groups into small and compact genera has as yet hardly begun, nor have the limits of many of the groups been accurately defined. It is toward this end that this paper is a slight contribution.

The two relatively very large genera, *Colpocephalum* and *Menopon*, with a few smaller genera, constitute the family *Menoponidæ*, a family that includes nearly one-fifth of all the known

Mallophagan species. The family contains a considerable number of unrecognized generic groups, for the separation of which characters must be used that have heretofore been almost entirely neglected. Of these characters those to be found in the chaetotaxy of the posterior femora are perhaps of first importance. The spines on the ventral face of these femora may be arranged in a series of "combs," which are always associated with similar combs upon certain abdominal sternites, or they may be arranged in a distinct patch or brush, usually associated with similar brushes on the abdomen, or they may be irregularly arranged or entirely lacking. The taxonomic value of the combs has already been pointed out by Harrison in the case of *Colpocephalum* (in its restricted sense) and *Tetrophthalmus*, but the brushes have apparently not, as yet, been noted in literature.

Of probably secondary importance are other characters, including the presence of either a slit or notch in front of the eye, the segmentation of the thorax, the presence of heavy spines on the ventral side of the head, the character of the chaetotaxy of the abdomen, the genitalia of the males and the presence of peculiar structures in the gular region.

Having in mind these characters, the group which this paper considers may be defined as follows.

Menoponidae with more or less distinct patches or brushes of spines upon the ventral face of the posterior femora and upon certain abdominal segments. Thorax three-segmented, usually distinctly so, although the mesothorax is sometimes much reduced. Head of a very characteristic shape, the temples very prominent, projecting well beyond the lateral margin.

The following key will serve to distinguish the included genera:

1. Head with a distinct notch (not a slit) in the lateral margin just before the eye.....2.
- Lateral margin of the head continuous to the eye.....3.
2. Femoral and sternal patches composed of spines which are distinctly smaller than those constituting the general chaetotaxy and are very closely crowded together.

Genus *Heleonomus*, n. gen.

Femoral and sternal patches small, composed of spines as large as those constituting the general chaetotaxy, with which the ventral patches sometimes merge.

Genus *Actornithophilus*, n. gen.

3. Oesophageal sclerite and glands apparently lacking, second sternite never with asters of heavy spines.

Genus *Dennyus* Neumann.

Oesophageal sclerite and glands present, although sometimes quite small; second sternite generally with asters of heavy spines.

Genus *Myrsidea* Waterston.

Genus ***Actornithophilus***, n. gen.

Figs. 10c, 11, 13f.

Menoponidæ with small, rather indefinite patches of spines upon the ventral face of the posterior femora and upon certain abdominal sternites, the spines composing the patches as large as those constituting the general chaetotaxy and sometimes merging with it. Thorax distinctly three-segmented, the mesothorax small, but clearly distinguishable. Head of a characteristic shape, the anterior margin rounded, the temples very prominent, their anterior margins nearly at right angles with the longitudinal axis of the body. Lateral margin with a distinct notch before the eye; this notch backed up by a small chitinous area. Oesophageal sclerite and glands present. Male genitalia apparently characteristic, consisting of a very long and slender basal plate, continuous distally with a lamina at the base of which the small paramera and slender endomera (?) are set.

Species occurring, at least for the most part, upon Charadriiformes (*Laridæ*, *Alcidæ*, *Charadriidæ*).

Type of the genus, *Colpocephalum uniseriatum* Piaget.

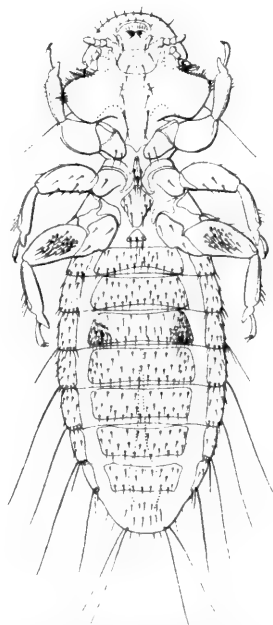


Fig. 11. — *Actornithophilus uniseriatus* (P), ventral side of male.

INCLUDED SPECIES.

From **Laridæ**.

- Colpocephalum abbotti* Kellogg.
Colpocephalum crassipes Piaget.
Colpocephalum epiphanes Kellogg and Chapman.
Colpocephalum funebre Kellogg.
Colpocephalum fuscipes Piaget.
Colpocephalum incisum Piaget.
Colpocephalum latifasciatum Piaget.
Colpocephalum maurum Nitzsch.
Colpocephalum milleri Kellogg and Kuwana.
(—*C. incisum* Piaget. ?)
Colpocephalum sulcatum Piaget.

From **Alcidæ**.

- Colpocephalum perplanum* Kellogg and Chapman.

From **Charadriidæ**.

- Colpocephalum bicolor* Piaget.
Colpocephalum cornutum Giebel.
Colpocephalum fumidum Kellogg.
Colpocephalum gracile Piaget.
Colpocephalum grandiceps Piaget.
Colpocephalum kilauensis Kellogg and Chapman.
Colpocephalum morsitans Kellogg.
Colpocephalum ochraceum Nitzsch.
Colpocephalum ocularis Carriker.
Colpocephalum pætulum Kellogg and Kuwana.
Colpocephalum patellatum Piaget.
Colpocephalum pustulosum Piaget.
Colpocephalum spinulosum Piaget.
Colpocephalum stictum Kellogg and Paine.
Colpocephalum tigrum Kellogg and Paine.
Colpocephalum timidum Kellogg.
Colpocephalum umbrinum Piaget.
Colpocephalum uniforme Piaget.
Colpocephalum uniseriatum Piaget.

From **Passerine Hosts**.

- Colpocephalum grandiculum* Kellogg.

The genus thus formed is a very homogeneous group, and is apparently characteristic of the Charadriiformes (as that order is understood by the more recent authors), especially of the Larolimicolæ. A single species, *A. grandiculus* (Kel.) is recorded from Passerine hosts, but it is possible that these records are unnatural. Only those species of which it is possible to be practically certain have been referred to the genus, and doubtless others will later be included. The list as given probably contains some synonyms, but this cannot at present be definitely determined.

The figures illustrating the genus are of *A. uniseriatus* (P.), the genotype, and *A. timidus* (Kel.).

Genus **Heleonomus**, n. gen.

Figs. 10d, 12, 13e.

Menoponidæ with very distinct patches of spines upon the ventral face of the posterior femora and upon the 4th abdominal sternite, the spines composing the patches very numerous, closely crowded together and distinctly smaller than those constituting the general chaetotaxy. Thorax 3-segmented, the meso-thorax small. Head of characteristic shape, the lateral margins slightly swollen above the bases of the antennæ, the temples prominent, reclined with the anterior margin set at a very sharp angle to the longitudinal axis of the body. Lateral margin of the head with a deep notch just before the eye, this notch backed up by a large chitinous area. Oesophageal sclerite and glands present. Male genitalia apparently quite characteristic, the basal plate extremely long and slender, the parameres large and stout, with the distal half curved sharply outward. A pair

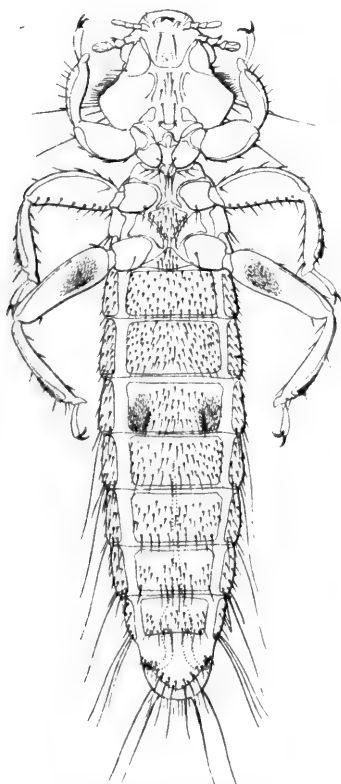


Fig. 12.—*Heleonomus miandrius* (Kell.), ventral side of male.

of conspicuous, tubular chitinous structures present in connection with the preputial sack.

Occurring, at least for the most part, upon Gruiformes.

Type of the genus, *Colpocephalum truncatum* Piaget.

INCLUDED SPECIES.

From **Gruidæ**.

Colpocephalum abdominale Piaget.

Colpocephalum assimile Piaget.

Colpocephalum miandrium Kellogg.

Colpocephalum truncatum Piaget.

Heleonomus confusus n. sp.

This little genus differs rather markedly in general appearance from the preceding, but the tangible characters upon which the two may be separated are few. The shape of the head and the character of the patches of spines, with the character of the male genitalia, are, however, sufficient to afford grounds for their separation. The males of three of the species are before me, and the genitalia of these three are all of the same peculiar type, so it may be assumed that they are the same throughout the genus.

Superficially the genus very closely resembles another group (*Colpocephalum* sens. str.), which occurs upon the same hosts, but which is marked by the presence of combs of spines upon the posterior femora. For this reason it is unsafe to refer species to the new genus without knowledge of this character, which has been entirely overlooked in most descriptions. Only those species of which there can be no doubt (four of them are before me) have been referred to the new genus.

The figures are of *H. miandrium* (Kel.), an entirely typical member of the group.

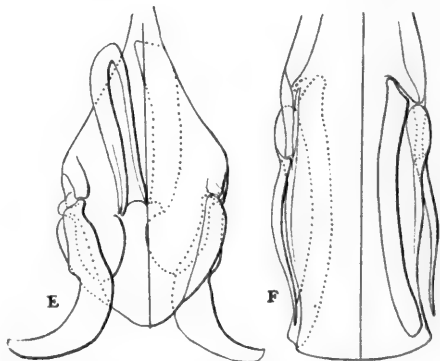


Fig. 13.—Genitalia, except basal plate of: E, *Heleonomus miandrius* (Kell.); F, *Actornithophilus timidus* (Kell.).

Heleonomus confusus, n. sp.

Colpocephalum miandrium (in part) Kellogg, Rept. Kilimandjaro Exped., No. 15, pt. 4, p. 53 (1908).

This species has already been described as the female of *H. miandrius* (Kel.). One of the two specimens at hand is a male in which the genitalia are very weakly developed, this fact, and their presence upon the same host, having led to the confusion of this species and *H. miandrius*.

Host, *Balearica regulorum gibbericeps* (Africa).

Genus **Myrsidea** Waterston.

Figs. 10b, 14.

Myrsidea Waterston, Ent. Monthly Mag., Vol. 51, pp. 12-13. (1915).

Menoponidæ with indistinct patches of spines upon the ventral face of the posterior femora and certain abdominal sternites, those upon the sternites merging more or less with the general chaetotaxy. Thorax distinctly 3-segmented, the metathorax frequently curiously modified and produced posteriorly. Head of characteristic shape, the forehead rounded, the temples very prominent and

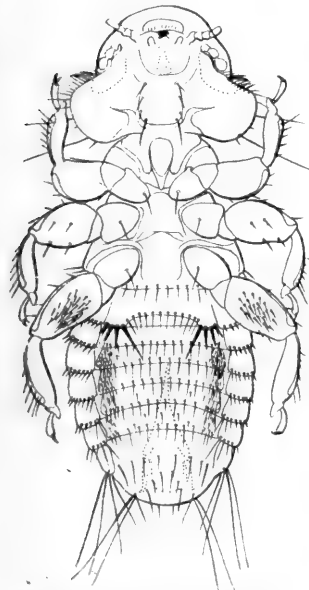


Fig. 14.—*Myrsidea diffusa* (Kell.), ventral side of male.

with the anterior margins nearly at right angles to the longitudinal axis of the body. Lateral margin of the head continuous with the eye. Oesophageal sclerite and glands present, although sometimes very small. Abdominal tergites of the female sometimes modified. Second abdominal sternite usually, but not always, with asters of heavy spines. Male genitalia of a type common to this genus and to *Dennyus*, the basal plate moderately long, continuous distally with a broad rounded lamina at the base of which the stout, apically recurved parameres are set.

Occurring for the most part upon Passeriformes, particularly the *Corvidæ*, but also occurring upon certain families of the *Coraciiformes*.

Type of the genus, *Myrsidea victrix* Waterston.

INCLUDED SPECIES.

Order PASSERIFORMES.

Family **Corvidæ**.

Menopon albiceps Piaget.

Menopon anathorax Nitzsch.

Menopon brunneum Piaget.

Menopon consimile Piaget.

Menopon euryternum Nitzsch.

Menopon funereum Kellogg and Chapman.

Menopon indivisum Piaget.

Menopon insolitum Kellogg and Paine.

Menopon interruptus Osborn.

Menopon mesoleucum Nitzsch.

Menopon nigrum Kellogg and Paine.

Menopon obovatum Piaget.

Menopon ovatum Piaget.

Menopon robsoni Cummings.

Colpocephalum sjoestedti Kellogg.

Menopon trinoton Piaget.

Menopon trithorax Piaget.

Family **Fringillidæ**.

Menopon conspicuum Kellogg and Chapman.

Menopon incertum Kellogg.

Menopon melanorum Kellogg.

Family **Sturnidæ**.

Menopon cucullaris Piaget.

Menopon invadens Kellogg and Chapman.

Family **Drepanididæ**.

Menopon cyrtostigmum Kellogg and Chapman.

Family **Hirundinidæ**.

Menopon dissimile Kellogg.

Trinoton stramineum Giebel.

Family **Icteridæ**.*Colpocephalum mirabile* Carriker.

Order CORACIIFORMES.

Family **Caprimulgidæ**.*Colpocephalum extraneum* Carriker.Family **Rhamphastidæ**.*Myrsidea victrix* Waterston.Family **Alcidinidæ**.*Nitzschia latifrons* Carriker.

The genus was well characterized by Waterston, but, as it appears to be a member of the group under discussion, the description has been repeated, with certain modifications and additions, in order to emphasize the resemblances to and differences from these other genera. No list of included species has heretofore been published.

Many of the included species, especially those upon the *Corvidæ*, are in some respects among the most peculiar of all the Mallophaga, due to the curious modifications of the metathorax of the female. Waterston has suggested that the genus should be still further divided, those species not sexually dimorphic being placed in another genus. However, it hardly seems best to do this, for every degree of dimorphism appears, nor are the modifications of any constant type. Even the asters of heavy spines on the second sternite of the abdomen, which appear in almost all of the species are lacking in *M. sjoestedti*, in other respects one of the most typical members of the group. It would seem that there is throughout the genus an "inherent" tendency to vary, and any further division is liable to result in artificial groupings. The figures are of *M. diffusa* (Kel.), a typical species.

Genus **Dennyus** Neumann.

Figs. 10a, 15.

Nitzschia (not of Baer), Denny, Mon. Anopl. Part., p. 230. (1842).*Dennyus* Neumann, Bull. Soc. Zool. France, Vol. 20, p. 60. (1906)

Menoponidæ with distinct patches of spines upon the ventral face of the posterior femora and upon the 8th and 6th abdominal sternites. Thorax distinctly 3-segmented, the prothorax very

narrow. Head of characteristic shape, the lateral margins continuous with the eye and slightly swollen above the base of the antennæ, the temples prominent. Oesophageal sclerite and glands apparently lacking. Anterior femora much flattened and expanded. Second abdominal sternite never with asters of spines. Genitalia of the male of the same type as in *Myrsidæ*.

Occurring, as far as known, only on Micropodidæ (Order Coraciiformes).

Type of the genus *Nitzschia burmeisteri* Denny.

The genus is in many respects very similar to some of the species of *Myrsidea* (*M. dissimile*, for instance), but the combination of characters given is sufficient to distinguish the two. There are less than a dozen species known, and some of these are apparently synonyms. *Dennyus dubius* (Kel.), which was described from immature specimens, is very likely a synonym of either *D. burmeisteri* or *D. tibialis*, but, in the absence of specimens of these two species, little can be done to settle the matter. *D. bruneri* (Car.) is almost certainly a synonym of *D. dubius*, as a cotype of the former which I have before me shows, and some of Carriker's other species appear doubtful. *Nitzschia latifrons* Carriker is almost certainly a *Myrsidea*.

***Dennyus distinctus*, n. sp.**

Description of female—Length 2.2 mm., colour a uniform dark brown.

Head as long as wide, triangular in shape, except for the rather broadly truncate anterior margin, which distinguishes the species from all the others in the genus. Occipital bands distinct, extending forward to above the bases of the mandibles. Principal points of the chaetotaxy as follows: A pair of slender hairs directly above the base of each mandible; a longer hair on the lateral

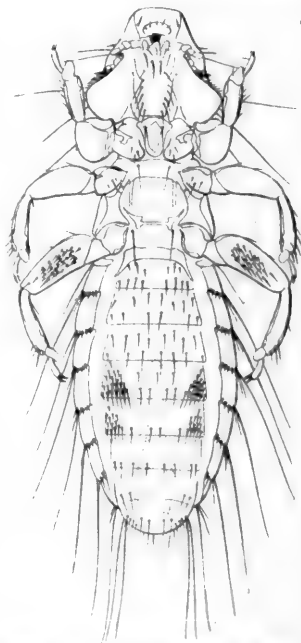


Fig. 15.--*Dennyus distinctus*, n. sp., ventral side of male.

swelling slightly in from the margin; a single long hair and two or three shorter ones at the margin on the lateral swelling; a close fringe of short hairs on the anterior margin of the temples; a transverse row of four long hairs on the occiput between the occipital bands.

Prothorax nearly as long as wide, rather quadrate in shape, rounded posteriorly; two or three short spines and a hair on each "shoulder," and six short hairs along the posterior margin.

Mesothorax and *metathorax* nearly equal in length, separated by a distinct suture. Metathorax with a transverse row of long hairs on the posterior margin.

Legs of the type common to the genus, the anterior femora flattened and much expanded.

Abdomen elongated, with nearly parallel sides, widest across the fourth or fifth segment. Each segment with a single transverse row of hairs along the posterior margin, the hairs not as long as the succeeding segment. Second to ninth segments each with a single extremely long hair and one or two shorter hairs at each posterior lateral angle.

Pleurites distinct, separated from the sternites by a narrow clear area, the posterior margin of each pleurite bearing a row of five or six short, thorn-like spines. First sternite short, heavily chitinized, the posterior angles produced back over the second sternite. Remaining sternites less heavily chitinized, but quite distinct. Each sternite with a transverse row of four to eight short, slender hairs along the posterior margin, the second to fifth with a few other scattered hairs. Fifth and sixth each with a distinct patch of closely set spines in each posterior lateral angle.

Description of male—Length 1.9 mm. Very similar to the female, the abdomen somewhat more pointed. Genitalia of the type common to this genus and to *Myrsidea*.

Two males, a female and two immature forms from *Collocalia* sp. (Samarang, Java, E. Jacobson coll.).

A very distinct species, differing in the truncate anterior margin of the head from any other of the genus, but in other respects an entirely typical *Dennyus*. Types in the Stanford University collection.

CANADIAN SPECIES OF THE BEE GENUS *STELIS* PANZ.

BY F. W. L. SLADEN, OTTAWA.

(The figures before names refer to species in the Canadian National Collection.)

Females.

1. Skin colour black.....2.
- Skin colour bronzy.....6.
2. Pale spot behind eye and pale line on inner margin of eye, last ventral segment of abdomen wide and rounded, and projecting far beyond last dorsal segment, which is angulated; length 5 mm.
- subg.....*Stelidium* Robt., 1060, *ontariana*, n. sp.

(?—*trypetinum* Robt.)

Ottawa, 16, VIII.

One specimen, J. I. Beaulne, 1912.

- No pale markings on head.....3.
3. Abdominal segments 1 and 2 or 1 to 3 or 4 with a small lateral spot, segments 4 and 5 often with two small inner spots, abdomen so closely punctured as to appear somewhat dull; length 5 mm.
- subg.....*Microstelis*, 1061 *lateralis* Cr.
- Ottawa, VII.

Segments with pale bands, more or less interrupted; abdomen less closely punctured,

- subg.....*Chelynia* Prov., 4.
4. Last dorsal segment with longitudinal ridge on apical portion; last ventral segment tridentate beyond apex of dorsum, the middle tooth long and acuminate.....1062, *rubri* Ckll.
- Banff, Alta, 25, VI.

Apex of abdomen without these structures.....5.

5. Abdomen elongate, pale bands all about equally interrupted in the middle, last ventral segment projects well beyond last dorsal segment, last dorsal segment with golden pubescence on margin, sting slender and pale.....1063 *submarginata* Cr.
- Abdomen rather broad, pale bands usually more widely interrupted on basal segments than on apical segments, last

ventral segment scarcely projects beyond last dorsal, last dorsal without golden pubescence underneath black hairs, sting stout, black.

.....1064 *federalis* Sm. (*nitida* Cr.)

Ont., Ottawa, 8, VI.

6. Segments 1 to 3 with complete yellow bands, segments 4 and 5 with narrow bands, some black hairs on vertex and pleura, length 6 mm.

(subg.....*Chelynia*), Ste. 1065.

Shawnigan, Vancouver Island, 8, VII.

No pale markings, head smaller, narrower than thorax, face much longer than broad, skin dark metallic blue-green, including legs; whole insect, including underside of abdomen, sparingly clothed with short black hair; margin of 6th dorsal segment reflexed.

.....*Pavostelis* (n. subg.) 1066 *montana* Cr.

Banff, Lethbridge, Alta., VI.

Males.

1. A pale spot above each eye and pale markings on inner margins of eye, surface of ventral segment without groove or ridge, four spots on segments 1 and 2, and two on 3 and 4; whole insect strongly punctured all over; length $4\frac{1}{2}$ mm.

subg.....*Stelidium* Robt., 1055, *ontariana* Sla.

(?—*trypetinum* RoLt.)

Pethesda, Ont., 15, VIII.

One specimen, Dr. Brodie, 1892.

Head without pale markings.....2.

2. Second recurrent nervure received at or beyond apex of second submarginal cell, 3rd ventral segment depressed in centre, generally a small pale spot on side of segments 1 and 2, often two small spots or a line on side of segments 3 and 4, segment 5 sometimes all black, abdomen so closely punctured as to be rather dull; length 3 to 4 mm.

subg.....*Microstelis* Anct. 3.

Second recurrent nervure usually received before the apex of second submarginal cell, abdomen with pale bands, often interrupted in centre,

subg.....*Chelynia* Prov. 4.

3. Wings normal.....1056 *lateralis* Cr.
 Ottawa, 6, VI, on *Potentilla*, etc.
 First recurrent nervure fails to reach submarginal nervure in
 either wings.....*maculatum* Prov.
4. Ventral segment 3 depressed in centre at apex; length 8 mm.
1057 (?*monticola* Cr.)
 One specimen, Vernon, B. C. (Venables).
- Ventral segment 3 raised in centre at apex, length less.....5.
5. Third ventral segment with low tubercle at apex in centre, the
 tubercle slightly produced beyond margin, bands on segments
 1 to 5 all about equally interrupted in middle, second sub-
 marginal cell longer than first, abdomen much longer than
 broad; length 4 to 7 mm.....1058 *subemarginata* Cr.
 N. B. to Man., Ottawa, 1, VI.
- Third ventral segment broadly raised at apex in centre, not
 produced, pale skin bands on segments 1 to 5 more widely
 interrupted on basal segments than on apical segments; on
 segment 5 they usually meet, abdomen almost as broad as
 long.....1059 *federalis* Cr. (—*nitida* Cr.)
 Ottawa, 6, VI, Toronto.

(In the compilation of the above tables the author is indebted for
 help to Mr. J. C. Crawford of Washington.)

A CURIOUS TRAP FOR DRAGONFLIES.

In a pasture just south of De Grassi Point, Lake Simcoe, Ont., there is an artesian well, consisting of an iron pipe driven perpendicularly into the ground to the required depth and projecting about 2½ feet above the surface. It terminates in a curved joint, from which the water strikes the ground almost vertically, with sufficient force to drill a hole about 10 inches deep into the soil. The water then spreads into a shallow puddle, used as a watering place for cattle and geese. Some of it, however, passes under a nearby fence into a ditch dug along the edge of a cultivated field. This ditch, which is not more than about a foot wide, is the haunt of a number of dragonflies, some of which probably breed nowhere else in the vicinity of De Grassi Point. The water is for the most part covered with duckweed (*Lemna*),
 September, 1916

and along the edges of the ditch cat-tail flags and many marsh plants grow.

While visiting this spot on August 9, 1916, I noticed a small dragonfly caught under the jet of water, and on looking closer I found no less than nine of these insects or their remains held down by the force of the cold stream. They were all at or near the surface, most of them more or less entangled in the mat of grass into which the water poured.

The following species were thus found: *Lestes unguiculatus* Hagen, 1♂, 1♀; *Lestes rectangularis* Say, 2♂, 1♀; *Lestes disjunctus* Selys, 1♂; *Libellula pulchella* Drury, 2♂, *Sympetrum* sp., fragments.

The *Lestes* were all alive and though somewhat benumbed were apparently none the worse for the cold shower. One of the *Libellulas* was alive but not very active, the other dead and broken.

On Aug. 12 I visited the spot and found *Lestes forcipatus* Rambur 1♂, 1♀, both alive; *Libellula pulchella*, dead; and some indeterminable fragments of *Lestes*.

No other insects besides dragonflies were found on either occasion. Other dragonflies which were found at this spot on these dates are the following:

Lestes uncatus Kirby.

Ischnura verticalis (Say).

Ischnura posita (Hagen).

Nehalennia irene (Hagen).

Æshna umbrosa E. M. Walker.

Æshna constricta Say.

Libellula quadrimaculata L.

Libellula lydia Drury.

Sympetrum obtrusum (Hagen).

Sympetrum semicinctum (Say).

The *Libellulas* were seen only about the puddle, where *L. pulchella* and *lydia* were common. The various species of *Lestes* were chiefly found along the ditch, but occurred also about the puddle; the other damselflies and *Sympetrum semicinctum* were found only along the ditch. *S. obtrusum* was generally distributed. The *Æshnas* were probably stray visitors.

E. M. WALKER.

NEW NORTH AMERICAN SPECIES OF THE
GENUS *GONOMYIA* Meigen.

(TIPULIDÆ, DIPTERA)

BY CHARLES P. ALEXANDER, ITHACA, N.Y.*

*Contribution from the Entomological Laboratory of Cornell University.

The species herewith described as new belong to the subgenus *Gonomyia*, the members of which have the cell R_2 of the wings present. As has been indicated in earlier papers it is almost impossible to identify isolated females in this genus and in most of the related Eriopterine genera, but the genitalia of the male sex offer remarkably clear-cut characters for the separation of closely related species.

Genus *Gonomyia* Meigen..***Gonomyia* (*Gonomyia*) *florens*, sp.n.***Male*—Length 4-4.1 mm.; wing 5.4-5.6 mm.*Female*—Length 5.8 mm.; wing 6.8 mm.

Rostrum yellowish brown, the palpi dark brown. Antennæ long and slender, the scapal segments yellow, the first flagellar segment brown, yellowish at the base, remainder of the antennæ dark brown; flagellar segments rather elongated, slightly enlarged just beyond the base. Head yellow with a brown median line.

Mesonotal præscutum light yellow with three dark chestnut-brown stripes which are almost confluent behind; pseudosutural foveæ very large and prominent; lateral margin of the sclerite yellowish becoming more whitish beyond the pseudosutural foveæ; scutum with the lobes rich chestnut brown, the inner edge adjoining the median area yellow, the lateral margin yellowish; scutellum and postnotum light yellowish to a large extent. Pleura pale yellow with a dark brown stripe from the ventral portion of the cervical sclerites running back to the base of the abdomen, enclosing the base of the halteres; mesosternum pale brown; the pale pleural stripe with a sparse whitish bloom. Halteres light brown, the knob pale. Legs with the coxæ pale yellow; trochanters brown; femora light brownish yellow; tibiæ yellowish brown; tarsi brown. Wings with a strong yellowish tinge, the stigma indistinct, the costa yellow, remaining veins brown. Venation: *Sc* moderately long, ending just before or opposite the origin of *Rs*; *Rs* gently

curved; R_2 a little shorter than R_{2+3} ; R_2 half again as long as the cross-vein $r-m$; outer deflection of M_3 obliterated so that cell 1st M_2 is confluent with cell M_3 ; basal deflection of Cu_1 at the fork of M .

Abdominal tergites brown, broadly margined with yellow; sternites yellow, the hypopygium concolorous. Hypopygium with the ninth tergite short, broad, the caudal margin transverse. Ninth pleurite very short and stout, the inner dorsal angle produced caudad into a blunt, fleshy lobe, whose inner margin is fringed with numerous long hairs; a short, blunt, fleshy knob at the base of this lobe, this knob provided with five long hairs on the margin; dorsal pleural appendage slender, originating just below the knob described above, directed proximad, the base enlarged with two or three stout hairs, the tip slightly bifid, the caudal arm with two bristles, the cephalic arm with one bristle; a stout bristle just before the tip on the inner or cephalic side; second pleural appendage a powerful chitinized hook, slightly curved, directed proximad, toward the apex bent strongly cephalad; ventral pleural appendage a slender fleshy rod, beyond the slightly enlarged base bent strongly dorsad so that it lies above the second appendage, at the tip directed caudad and here capped with a short, blunt, chitinized spine. Ninth sternite with a prominent median knob on the caudal margin, this knob with numerous setigerous tubercles.

Habitat—Eastern United States.

Holotype—♂, Indian Castle, Herkimer Co., N.Y., June 9, 1915, (Alexander).

Allotype—♀, topotypic.

Paratypes—3♂ ♀, topotypic.

The types are in the collection of the author.

G. florens may be distinguished from the closely related *G. cognatella* O. S. by its slightly larger size, brighter colouration, and the male genitalia (the powerful curved second appendage, the short, black apex to the ventral appendage, etc.).

Gonomyia (Gonomyia) flavibasis, sp. n.

Male—Length 5.2 mm.; wing 5.3 mm.

Rostrum and palpi dark brown. Antennae with the two basal segments bright pale yellow; flagellar segments brown with a dense

pale pubescence that is most noticeable on the basal segments. Head yellow with a dark brown median mark.

Pronotum yellow, slightly darkened medially. Mesonotal præscutum yellow with three dark brown stripes, the lateral pair being almost confluent with the broad middle stripe; lateral stripes removed from the margin of the sclerite and beginning just back of the pseudosutural foveæ; the latter is elongate rectangular, chestnut in colour; scutum yellow, the greater portion of each lobe brown; scutellum brown basally, the caudal half yellow; postnotum brown, the sides of the sclerite yellow. Pleura light yellow with two dark brown stripes as follows: dorsal stripe narrow, clear-cut, beginning on the cervical sclerites, running backward just above the base of the fore coxæ and above the base of the halteres; the ventral stripe occupies the mesosternum and is of a much paler brown than the other stripe; the yellow stripe enclosed is very pale, suffused with whitish. Halteres pale, the knobs slightly infuscated. Legs with the coxæ and trochanters light yellowish brown, the fore coxæ whitish yellow on the outer face; femora, tibiæ and tarsi very pale brown, the latter dark brown on the last three segments. Wings nearly hyaline, the stigma indistinct, the veins brown. Venation: *Sc* short, ending far before the origin of *Rs*, this distance about equal to vein *R*₂ alone; basal deflection of *R*₄₊₅ very short or lacking; basal deflection of *Cu*₁ beyond the fork of *M*, this distance a little shorter than the first deflection of *M*₁₊₂; cell *1st M*₂ open.

Abdominal tergites dark brown, the terminal segments slightly margined with yellowish; sternites light yellow. Hypopygium with the pleurites rather long and slender, the dorsal angle produced caudad as a flattened, fleshy lobe that bears many hairs on the dorsal face; appendages two, the first appendage very long, flattened, the apex bent, the surface of the arm with many long hairs; second appendage complex consisting of a chitinized hook that is slightly bent; underneath the base of this hook is a fleshy lobe with several short bristles on the outer face; above the base of the hook is a slender subchitinized rod that is darkened at the tip.

Habitat—Western United States.

Holotype—♂, Monterey Co., California; July 18, 1896.

Part of the W. M. Wheeler collection in the American Museum of Natural History.

This fly belongs to the *cognatella* group and is closest to *G. delicata* Alexander (Guatemala) but the venation is quite different in the longer subcosta, the different shape of the sector and other venational details.

Gonomyia (Gonomyia) noveboracensis, sp. n.

Male—Length 4 mm.; wing 4.9 mm.

Rostrum light yellowish brown, the palpi dark brown. Antennæ black throughout, the basal segments enlarged, the flagellar segments very short, tapering suddenly to the tip of the appendage. Head light gray.

Pronotal scutellum white, dark brown medially. Mesonotal præscutum plain grayish brown, the area behind the pseudosutural foveæ paler, more yellowish; scutum similar; scutellum brownish yellow; postnotum brown with a sparse grayish bloom. Pleura white with two brown stripes, the dorsal one beginning on the cervical sclerites and continuing back to the wing basis; the ventral stripe occupying the mesosternum. Halteres pale. Legs with the coxæ and trochanters brownish yellow; femora, tibiae and tarsi uniform dark brown. Wings light gray, the stigma not indicated; costal vein yellow, the remaining veins dark brown. Venation: *Sc* short ending far before the origin of *Rs*, this distance sub-equal to the cross-vein *r-m*; *Rs* rather short, rather sharply bent just beyond the base, a little shorter than *R*₂₊₃; *R*₂ oblique, a little longer than the cross-vein *r-m*; basal deflection of *Cu*₁ at or just beyond the fork of *M*.

Abdominal tergites dark brown, broadly margined with silvery; sternites similar, narrowly ringed caudally with silvery; hypopygium reddish yellow. Hypopygium with the ninth tergite having the caudal margin with a broad rounded concavity. Ninth pleurite prominent, elongate, the dorsal inner edge with a prominent tubercle that bears several hairs, the ventral inner edge with a row of large setigerous tubercles; three small pleural appendages, a small, inner, dorsal, cylindrical appendage directed cephalad, slightly enlarged basally, at the apex bearing three or four prominent hairs; a dorsal apical appendage directed proximad, flattened,

enlarged at the apex which bears a row of delicate hairs; a slender subchitinized ventral apical appendage that is directed proximad, slightly toothed at the tip and on the lower side just before the tip. Gonapophyses and the penis-guard fused into a very large, prominent, cylindrical tube that is armed with chitinized horns and fleshy lobes; the dorsal surface of the tube with two subpendulous, fleshy lobes that are approximated along the median line and densely provided with short, pale hairs; the horns of the cylinder are directed caudad and slightly ventrad; the outermost horns are very broad at the base tapering to the acute apices which are curved proximad; the next inner pair of horns slender, chitinized, bifid at the apex; innermost pair of horns slender, slightly twisted, narrowed to the apex. Ninth sternite with a broad V-shaped median notch, the adjacent angles produced caudo-laterad as fleshy lobes that are provided with numerous setigerous punctures.

Habitat—Eastern United States.

Holotype—♂, Sacandaga Park, Fulton Co., New York; June 11, 1914, (Alexander).

Paratype—♂, topotypic.

The types are in the collection of the author.

Gonomyia (Gonomyia) filicauda, sp. n.

Male—Length 4.8-5.2 mm.; wing 6.3-6.4 mm.

Female—Length 5.4 mm.; wing 6.6 mm.

Rostrum and palpi dark brown, the last palpal segment slender, equal to the preceding two together. Antennæ dark brownish black throughout, the flagellar segments elongate-oval with an abundant pale pubescence and a few stout, black hairs. Head blackish with a dark gray bloom, slightly paler around the occiput.

Pronotum pinkish, the median line broadly dark brown. Mesonotal præscutum dark grayish brown without apparent stripes; sides of the præscutum, median area of the scutum, posterior half of the scutellum and sides of the postnotum light yellow. Pleura light yellow with large dark brown areas representing two interrupted stripes, as follows: on the proepisternum, mesepisternum, mesosternum, a narrow area just in front of the base of the halteres, the anterior face of the fore coxæ and the lateral

face of the posterior coxæ. Halteres very long and slender, pale. Legs with the coxæ yellow marked with brown as described above; trochanters brownish yellow; femora brown, slightly paler at the extreme base; tibiæ and tarsi dark brown. Wings with a strong grayish brown tinge; stigma pale brown; veins dark brown; venation: *Sc* rather long, ending slightly beyond the origin of *Rs*; *Rs* very long, longer than R_{2+3} ; basal deflection of R_{4+5} very short or lacking; *r-m* very long, arcuated.

Abdominal tergites dark brown, the extreme lateral margins and the parts of the hypopygium largely yellowish; sternites light brown, the caudal margin very broadly ringed with yellow. Hypopygium with the pleurites moderately long, the dorsal angle produced caudad and slightly dorsad as an elongated fleshy lobe that is sparsely hairy, the hairs on the outer face strong, those on the inner face weak; dorsal pleural appendage a short, fleshy lobe whose caudal margin is produced into a powerful, curved, heavily chitinized hook, directed inward and dorsad; at the tip of the fleshy portion of the lobe are two stout hairs and a group of about eight smaller ones; ventral pleural appendage very long, slender, beyond the base slightly expanded, the apical portion slender, slightly expanded toward the tip, dusky in colour and provided with an abundance of long, delicate hairs. Penis-guard pale in colour, simple, slender from an enlarged base, the apex split by a deep, rounded notch.

Habitat—Rocky Mountain Region.

Holotype.—♂, Webster, Colorado, near Platte Canyon; August 24-26, 1915; altitude 9,500 feet (E. J. Osler).

Allotype.—♀, topotypic.

Paratypes.—30 ♂ ♀, topotypic.

The types are in the collection of the author.

Belongs to the *subcinerea* group; a long-winged, dark-winged fly with exceedingly elongate halteres. In some specimens the pale colour on the sides of the mesonotal praescutum is obscured by the gray-brown of the dorsum.

Gonomyia (Gonomyia) mexicana, sp.n.

Male.—Length 6.1 mm.; wing 6.8 mm.

Female.—Length 7 mm.

Similar in colour to *Gonomyia unicolor* Alexander (Guatemala) but larger, the mesonotum more grayish, pseudosutural foveæ and tuberculate pits black, conspicuous, and the venational details slightly different.

Antennæ uniformly dark brown throughout. Pronotal scutellum light yellow. Mesonotal præscutum grayish brown, shiny, without apparent stripes; a rather light yellow area before the pseudosutural foveæ; a dull yellow area between this foveæ and the transverse suture and a small yellow spot on the sides of the scutal lobes above the wing-root. Wing-venation: R_{2+3} twice the length of R_2 and much longer than Rs ; $r-m$ nearly as long as the basal deflection of Cu_1 , the latter inserted at from one-quarter to one-third the length of cell 1st M_2 . Male hypopygium with the ninth tergite rather short, the caudal margin straight or nearly so; ninth pleurite elongate, rather stout, the dorsal pleural appendage rather short, cylindrical, fleshy, the cephalic or inner angle of the apex with two strong, powerful bristles, the caudal or outer angle with two smaller hairs; second pleural appendage strongly chitinized, the tip acute, curved; ventral pleural appendage a long, pale lobe, subcylindrical, blunt at the apex and bearing sparse elongate hairs; penis-guard very long and pale, the apex bifid by a deep U-shaped notch, each of the lobes thus formed with long hairs; on the ventral face of this arises a slender, rod-like median appendage, sparsely short-hairy at the apex and down the ventral face; the divergent subtending arms are slender, somewhat flattened, the apices produced into a slender cylindrical point, the outer or ventral margin with a few sharp, appressed teeth.

Habitat—Mexico.

Holotype—♂, Cordoba, Mexico; May 8, 1908 (Frederick Knab).

The type is in the United States National Museum.

This species was earlier determined as being *Gonomyia unicolor*, variety, (Proceedings of the United States National Museum, vol. 44, p. 507, 1913); the differences between these closely allied forms will be indicated in connection with the next species, *Gonomyia æqualis*, n.

Gonomyia (Gonomyia) æqualis, sp.n.

Male—Length 6.1 mm.; wing 6.6 mm.

In all general features quite similar to *Gonomyia mexicana*, the main differences lying in the genitalia of the male, these being as follows: Ninth tergite almost straight across or slightly concave; ninth pleurite moderately stout, the dorsal angle produced caudad as a very slender, finger-like lobe, which is provided with numerous setigerous tubercles; at the base of this lobe on the inner side is a tiny, fleshy protuberance directed proximad; dorsal pleural appendage irregular, fleshy, directed proximad, the caudal or outer face near the apex with a strong, curved, chitinized hook, which is directed dorsad and cephalad, the cephalic or inner face with a row of strong bristles which are longer and more approximated at the tip; ventral pleural appendage a pale, fleshy lobe densely covered with short, pale hairs; penis-guard rather long, compressed, the median appendage pale, slightly curved; anal tube broad, prominent, subtended on either side by a concave wing that bears on the caudal outer angle a fimbriate tuft of yellow bristles.

Habitat—Guatemala.

Holotype—♂, Totonicopan, Guatemala; July, 1902; (G. Eisen).

Allotype—♀, topotypic.

The types are in the United States National Museum. This species was earlier determined as being a variety of *Gonomyia unicolor* (Proceedings of the United States National Museum, vol. 44, p. 507, 1913), but is readily separated from both *unicolor* and *mexicana* by the structure of the male genitalia. In *G. unicolor* the hypopygium may be described as follows: Ninth tergite almost straight across or slightly concave; ninth pleurite moderately stout, elongated, the dorsal angle not produced; dorsal pleural appendage a subcylindrical, fleshy lobe from an enlarged base, at the apex, with two powerful bristles, the cephalic or inner face with four small hairs that are evenly spaced; ventral pleural appendage a double lobe, dark-coloured, subchitinized, the inner arm stout, cylindrical, with the tip acute, the inner side with two or three hairs, the outer or more ventral arm is slender, curved, and bears

near the tip two stout divergent hairs; penis-guard seen from beneath, a powerful, quadrangular, chitinized base whose caudal angle is a ventrally directed hook, the base on either side subtended by short gonapophyses that end in sharp, chitinized, conical spines; from above and dorsal of the quadrangular base arise two divergent, cylindrical, pointed, chitinized arms.

Gonomyia (Gonomyia) californica, sp.n.

Male—Length 7 mm.; wing 6 mm.

Female—Length 7-9 mm.; wing 6.6 mm.

Rostrum and palpi dark brown. Antennæ with the first segment dull yellow above, the flagellum dark brown. Head bright, pale yellow passing into brown on the sides of the occiput and vertex; a narrow, dark brown median vitta.

Pronotum pale with two divergent brown lines that are connected at the anterior end. Mesonotal præscutum dull yellow with three dark brown stripes that are confluent, only the areas about the pseudosutural foveæ and backward along the margin of the sclerite being of the ground colour; scutum light brown, the lobes dark brown, a dull yellow spot on the lateral margin above the wing-root; scutellum mostly brown, margined caudally with yellow; postnotum dark brown, the basal portions yellowish. Pleura light yellow with two dark brown bands, the dorsal one beginning on the propleura and including a small spot at the base of the fore coxa, continuing backward as a broad band that surrounds the base of the halteres and becomes confluent with the brown of the mesonotal præscutum; the ventral band begins behind the fore coxa, occupies the mesosternum and includes the base of the middle and hind coxæ. Halteres pale, the knob brown. Legs with the coxæ as described above; trochanters pale yellow; femora dull yellow with a dark brown anteapical annulus; remainder of the legs broken. Wings subhyaline, the costal veins yellowish, the remaining veins brown; dark brown spots on the wing-disk as follows: at the humeral cross-vein; at the arculus; at the origin of R_s ; at the tip of Sc_1 ; along the basal deflection of Cu_1 ; at the basal deflection of R_{4+5} ; cross-vein m ; a large stigmal area; at the fork R_{2+3} ; at the tips of cells R_3 and R_5 ,

and a faint seam along the cross-vein *r-m*; venation: *Sc* long, extending beyond mid-length of the long sector; *R*₁ and *R*₂ scarcely contiguous at the wing-margin; basal deflection of *Cu*₁ before the fork of *M*; basal deflection of *M*₃ absent.

Abdominal tergites dark brown, the caudal and lateral margins dull yellow; segment eight largely yellow except the extreme base which is brown; segment nine yellow with a narrow basal ring with a slight median projection caudad; sternites dark brown, deepest sublaterally, the caudal and lateral margins dull yellow. Hypopygium having the ninth tergite with a deep, narrow median notch, the lateral angles rounded. Ninth pleurite stout, the outer angle produced caudad into a slender fleshy lobe that is pointed at the apex and sparsely provided with setigerous tubercles; dorsal pleural appendage a triangular fleshy lobe that is provided with long coarse hairs; ventral pleural appendage, a two-armed chitinized rod whose outer ventral arm is stout basally, narrowed toward the apex which is again expanded into a blunt tip; the inner arm bends dorsad, slender, tapering into an acute blackened apex. Penis-guard prominent, the sides subparallel, the apical half on the dorsal surface with numerous hairs, the apex produced ventro-caudad into a prominent median lobule.

Habitat—Western America.

Holotype—♂, Blue Lake, Humboldt Co., California; June 20-27, 1907 (J. Chester Bradley).

Allotype—♀, topotypic.

Paratypes—1♂, 1♀, topotypic; 1♀, Peachland, British Columbia, May 19, 1912; 1♀, topotypic, June 24, 1903.

The type is in the collection of Cornell University, paratypes in the collection of the author. The two last-named paratypes were earlier determined as *G. blanda* O. S. (Proceed. Acad. Nat. Sci. Phila., October, 1914, p. 286, 287).

This interesting species is nearest to *G. blanda* O. S. differing in the striped pleura, the long subcosta with a dark blotch at its tip, the slight amount of dark colour in the apices of cells *R*₃ and *R*₅, and in conspicuous details of the male hypopygium.

GEOMETRID NOTES.

NEW SPECIES AND VARIETIES.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

Macaria fieldi, n. sp.

Male—Expanse 20-23 mm. Head, antennæ and legs light ashen gray. Thorax and abdomen light ashen gray, with a slight pinkish cast. Fore wings light ashen gray intradiscally, becoming fuscous beyond. They are clear ashen gray to the basal line, which is broad and strongly black at the inner margin, running at a slight angle to the median vein, where it seems to fade out, and there is just a trace of an orange line to the costa. The mesial space is also clear ashen gray, sometimes with a pinkish cast in fresh specimens. Discal spot black, with a paler centre, forming a ringlet of considerable size. The extradiscal line appears as a spot on the costa, just below which it is apparently broken off, running out sharply at a right angle, then connecting with a heavy black line, which runs almost straight to the inner margin, curving in slightly from M_3 to the margin. The black extradiscal line has a faint orange line bordering it inwardly, appearing stronger when the black is faded out. Beyond the extradiscal line there is an irregular blackish or fuscous clouding, apparently bordered by an irregular whitish line. Beyond this clouding the margin of the wing is slightly paler, and there appears to be a minute black dot at the base of the fringe on each vein. Fringe on all the wings fuscous. Hind wings basally light ashen, darker at outer border, more or less strigated. There is a prominent black discal spot; beyond this an extradiscal line, which runs straight across the wing, sometimes fading out before reaching the outer margin. Beyond this is a faint whitish line, appearing like a continuation of that of the fore wing, though not apparent in all specimens. Beneath, very pale ashen, the lines above showing through. The fuscous clouding appears on both fore and hind wings, not quite reaching the outer margins. The discal spots are prominent and black on all the wings.

Female paler than the male, the black extra- and intradiscal lines very faint, with an orange shading, sometimes appearing as pale orange-coloured lines. Fuscous clouding less heavy. Beneath,

September, 1916

the female is more strigated and there is a tendency for the shading to form a more distinct extradiscal band than in the male. On the hind wing, however, the clouding never forms a band to the margin of the wing.

This species bears a slight resemblance to *snoviata* Packard and *puertata* Grossbeck, but differs from both in the straight extradiscal line on both fore and hind wings and in the marginal band beneath.

I take pleasure in naming this species after Mr. George H. Field, who has done so much to advance our knowledge of California Lepidoptera.

Holotype—♂, La Puerta Valley, Calif., July 11; in my collection at the Museum of Comparative Zoology, Cambridge, Mass.; received through the kindness of Mr. Field.

Allotype—♀, La Puerta Valley, Calif., July 11, in Mr. Field's collection at San Diego, Calif.

Paratypes—♂'s and ♀'s, from same locality, in Mr. Field's collection and my own.

***Macaria grossbecki*, n. sp.**

Male—Expanse 22-23 mm. Head, antennæ and legs fawn-coloured. Thorax and abdomen brownish ashen, darker than in *fieldi*, with a suffused appearance, without conspicuous lines or markings as in the other species. Intradiscal line faint, pale orange, shaded with black; mesial space heavily strigated, as in the entire wing; not paler, as in *fieldi*. Discal ringlet clear black, with paler centre. Extradiscal line faint, blackish, with slight clouding. Veins with faint minute dots, fringe fuscous. Hind wings of the same colour as fore wings, with a trace of an irregular extradiscal ochreous line, blackish-shaded. Beneath paler than above, the discal ringlets showing on all the wings. No markings apparent, except the extradiscal brown marginal band, which shades to the outer margin; in this respect differing from *fieldi*.

Female—Similar above to the male; beneath much lighter basally, where it is strigated, a brownish band running extradiscally solidly to the outer margin.

Viewed from beneath, this species has somewhat the appearance of *puertata* Grossbeck; but above, it appears very different

on account of the lack of any heavy markings. It is possibly a suffused variety of *puertata*, but the markings above seem to indicate a distinct and apparently rare species.

I take pleasure in naming this form in memory of Mr. John Grossbeck, whom I considered our best authority on the Geometridæ, and who, shortly before his death, wrote me that he was taking up the mixed *Macaria-Sciagraphia* group. Unfortunately he was never able to finish this work, having only commenced to assemble the material at the time of his decease.

Holotype—♂, La Puerta Valley, Calif., July 11 (G. Field); also in my collection.

Allotype—♀, La Puerta Valley, Calif., July 11 (G. Field); in my collection.

Paratypes—Both sexes, from same locality, all taken by Mr. Field; in his collection and mine.

***Macaria minuta* (Hulst).**

Another species, which I was intending to describe, I came across labelled by Mr. Grossbeck as *Diastictis minuta* Hulst. If this identification is correct, as I believe it to be, the species is not a *Diastictis*, but a *Macaria*.

Above, it has a slight resemblance to *M. grossbecki*; but below, the extradiscal shading forms a bright ochre band, which is not solid, and extends only half way to the outer margin.

I have a very pale female, labelled by Mr. Grossbeck, in error, "*Sciagraphia heliothidata*?" Evidently it puzzled him. I think the strong fuscous marginal shading above and the light ochre below will serve to distinguish this obscure species. Hulst was doubtless puzzled through having only females. There are four brown spots on the costa, from which run pale, irregular, orange, black-shaded lines.

Macaria puertata Grossbeck is one of the most easily recognized species, and should be readily known by the characters of the underside, as should all these closely-related species.

My specimens of *M. minuta* are from La Puerta Valley, Calif., July 11, and Prescott, Ariz., Aug. 13, collected by Messrs. Geo. H. Field and E. J. Osler

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POPULAR AND PRACTICAL ENTOMOLOGY.

FROM THE EDITOR'S OFFICE CHAIR.

BY R. P. DOW, EDITOR OF THE BULLETIN OF THE BROOKLYN
ENTOMOLOGICAL SOCIETY.

Practically every periodical devoted to insect study (and there have been more than fifty such in North America) is the organ of some scientific society, and its mission is to bring to that society the credit of making permanent record of discoveries of lasting scientific value. No entomological magazine has been more than barely self-supporting, and few that much. The magazine is necessarily "dry" reading, its papers for the most part severely technical. The dyed-in-the-wool bug man rather resents popular articles dealing in generalities. The paper most esteemed is one making description of new species. Such is of value for reference so long as Science endures, but how many wish to read a minute description of the external anatomy of some insect he has never seen? Only the few specialists in that particular group. I do not believe that the average subscriber to our entomological journals finds an average of more than two interesting papers out of the dozen in an average number. The Lepidopterist does not care for a paper on *Thrips*, and so on.

It is the editor who has to read all papers. If he be "on the job" he takes down boxes of specimens and proves the correctness of every detail of synopsis submitted to him. If he can understand, it follows that a specialist will have no difficulty. The editor reads painstakingly, glossary in hand. The casual reader gives two minutes, where he gives hours.

And yet every editor, while on the one hand trying to do his duty by strict Science (no matter how dry), makes his best effort

that the magazine be readable by the greatest possible number of subscribers. He tries to balance his subjects, so that there are no superabundance dealing with any one order. Most amateurs are interested in the Lepidoptera, but papers on this order containing new material are very scarce. The greatest number of students are collectors of the Coleoptera, but it takes a year to prepare a synoptic table of beetles which the reader disposes of in ten minutes. The additions to the sum total of human knowledge are more in the lesser known orders, Diptera, Hymenoptera and the minor ones. Of all these there are few amateurs to read. So, in the effort to please as many as possible, one succeeds in pleasing almost no one.

On this particular editor's desk there have lain letters from well over a thousand entomologists or collectors of insects. Less than one per cent. contain praise of some article. Fifteen per cent. come from professional entomologists, most of them demurring against further subscription. The leading authority on grasshoppers does not subscribe, because the few grasshopper papers are sent to him anyway by the friendly authors, and he does not wish to burden his bookshelves with matter concerning crickets or roaches. The economic entomologists are too intent on their own useful observation of some pest to read anything whatever, much less identify a species. They send to Washington to have that done. Eighty per cent. of the letters on the editor's desk are from amateurs. There are many of them, if only there was a way to reach and talk with them. In 1823 a list of butterfly collectors in Great Britain contained 18,000 names. Here in North America a popular, rather expensive, highly illustrated butterfly book has reached a sale of something like 90,000 copies. A few per cent. of these readers have come in contact with some entomological magazine. The burden of their speech is pretty much the same throughout. The Canadian Entomologist, the Brooklyn Bulletin, and all the rest, are too far above their heads, too technical, too hard to understand, containing too little to help them identify the species they have caught.

One cannot read without having learned the alphabet. How many of our collectors have more than a single book to teach

them the fundamental principles? In a magazine of few pages there is no room for repetition of the rudiments. We ourselves cannot comprehend how any one can be willing to stick a pin through an insect without possessing a short shelf of books to tell what it is, why it is, how its life is passed, what are its relationships. The writer recalls perfectly his own first entomological experiences. A little girl in frail health had been taught by an older brother to collect and try to study. To help her the writer took the net and pursued butterfly and dragonfly. The first evening came the first earnest perusal of the first book. It was Comstock's Manual. It gave the order and the family, and had wood-cuts illustrating typical forms. At each chapter there was a delightful essay by Anna Botsford Comstock in general terms that a child could understand. Long before there had come to hand books by a Brooklyn artist who used to love his daily walk behind the Flatbush waterworks, where the watershed was so protected that Nature found her free sway. Wm. Hamilton Gibson wrote most of his papers for Harper's Magazine, but all were subsequently reprinted in quarto book form with the hundreds of illustrations from thumb-nail sketch to full page plate. Most of these are probably out of print years ago, but every copy found in second-hand bookshop should be bought and treasured. The late Henry G. McCook many years ago wrote a duodecimo called "The Tenants of an Abandoned Farm." The wood-cuts were rough but they had their charm, telling of spiders, ants, and a host of others. A few years ago a new edition appeared, with some changes and a different title. All these preach the sermon of the infinite beauty of the great All Out Doors.

Every stranger who in the last two years has wandered into a meeting of the New York or the Brooklyn Entomological Society has been influenced thither by some book. Chief among them have been the volumes of the late J. H. Fabre, a Frenchman, now almost all translated into English. This wonderful man, overlooked by the world almost to the hour of his death in extreme old age, found and studied the infinities of animate creation in his own back yard. In a forty foot square countless creatures are born, married and died (just like humans). How much more did this impoverished Apostle of Nature accomplish than some

other enthusiast who searched the uttermost corner of the globe for some rarity of which he could know nothing except a scientific name applied by some subsequent taxonomist. Every human being conscious that God gave him eyes with which to see may well start his bookshelf with some volume of Fabre.

Sir John Lubbock kept for many years a little nest of ants between two sheets of glass until he learned to distinguish each individual by sight. His works, although severely scientific, read easily as fiction. Get, then, your library, your two-foot shelf of priceless books. Little by little pass from primer to second and third readers. A few good books are designed for young people, but are fully as interesting to grown-ups. Such a one is Beard's American Boys' Book of Bugs, Butterflies and Beetles. It can easily develop the collecting habit. Then comes a booklet published by the American Museum of Natural History in New York, How to Collect and Preserve Insects. It costs but ten cents. The work of almost every country collector is rendered almost valueless for scientific purposes by ignorance of simple methods of care.

To any one progressing thus far some text book on Entomology becomes a necessity. On the editor's table stand four such, each having some distinctive interest, although covering the same theme, —Guide to the Study of Insects by the late Asa Packard of Brown University, of which there have been many editions; Economic Entomology, by the late John B. Smith, of Rutgers College; Manual for the Study of Insects, by J. H. Comstock, of Cornell University; and Entomology with Reference to its Biological and Economic Aspects, by J. W. Folsom, of the University of Illinois,—Blakinson. There can be no choice between these four leading text books. All are most readable. *Chacun à son gout*. Differing very slightly, perhaps a little less comprehensive, but with more detail in spots is American Insects, by Vernon C. Kellogg, of the University of California. Of the Cambridge Natural History, volumes V and VI treat of Insects, by Dr. Sedgwick and Dr. David Sharp. In this the specific examples given are British or world-wide.

To fill even a two-foot shelf possibly next consideration should

be given to the economic aspect. Three cover much the same ground, all finding favour on the editor's table, for the independent illustrations glorify all of them:—Manual of Fruit Insects, Slingerland and Crosby, of Cornell; Insect Pests of Farm, Garden and Orchard, by D. Sanderson; and Agricultural Entomology by Herbert Osborn, of the University of Ohio. The New York State Museum issued two quarto volumes on Insects Affecting Park and Woodland Trees, by E. P. Felt, State Entomologist, with a wonderful wealth of illustration chiefly of beetles, by L. J. Joutel, but this monumental work may be now a little hard to procure.

Next on the shelf of working library comes works on particular groups. Most of these are somewhat expensive, for colour plates cost much to publish. Wright's Butterflies of the Pacific Coast is the best and most complete for its territory. The American Museum of Natural History booklet, Our Common Butterflies, is perfectly workable and costs only fifteen cents. The standard work on Butterflies of North America is by W. J. Holland. Its colour plates will serve for identification of species, except in the "skippers" and some of the more obscurely marked Nymphalidae. The collector of Hesperiidæ must consult some specialist in the family or leading Museum to be sure of correctness.

The Moth Book, by W. J. Holland, is equally well illustrated and serves for final identification of all large or showy forms. The "millers" are represented by about half the number of distinctly known species (the whole being too voluminous) and from the book a perfectly good general knowledge can be gained. For exact identification, however, one must look farther. There are whole groups of Noctuid moths, scientific knowledge of which is still woefully incomplete. No good book exists on the thousands of species of the Microlepidoptera, of which probably one-half are not yet known to Science. A synonymical catalogue of all known American Lepidoptera was prepared by H. G. Dyar and staff of specialists, known as Bulletin 52 of the U. S. National Museum, but this wonderful work was treated as are most of the Government publications, sent to an army of legislators who cared nothing for them, and within a few months "out of print"

for the entomological students to whom the volume is of priceless value.

An "Insect Book," by L. O. Howard, U. S. Government Entomologist, with full quota of coloured plates, was published to include all orders except Lepidoptera and beetles. It is no reflection upon Dr. Howard to say that this work is unsatisfactory, since it had to be made uniform with others for the publishers, and so had to cover in the single volume a field requiring at least ten volumes to be essential to even a four-foot book shelf of working library of a Nature lover. However, it is well worth owning. As it covers a field in which many hundred thousand species exist, it is not a guide to identification even to the genera.

Uniform is the Spider Book, by J. H. Comstock, combining exact science and popular readability. Its illustrations are equal to the others of the series, and it serves well for identifications of species. A number of spider books by J. H. Emerton have mostly wood cuts, but well made, and with clearly written text. They are inexpensive. A work of highest scholarship and popular interest is the Ant Book, by Wm. Morton Wheeler. No work on the subject compares with it for completeness or offer of correct identifications. On the Diptera (the true flies) there is one good book, by S. A. Williston. In this enormous field final identifications are impracticable. A Catalogue of Described Diptera, by J. M. Aldrich, was a Smithsonian publication, remarkable for its accuracy in a little known field, but it suffered the same fate as Dyar's catalogue of Lepidoptera and second-hand copies command a large price.

There is no good work on the Hemiptera, or true bugs. The manuals of entomology give good chapters. An excellent checklist of the Hemiptera, by E. P. Van Duzee, has just been published by the New York Entomological Society, but, of course, a list does not contain facilities for identifying species. A definitive and popular work on the Hymenoptera is also impracticable since they are not easily pictured, and since the number of species is enormous, a large fraction of the smaller parasitic forms not yet being known.

Thus far there has been no mention of beetles, although that

order is the prime favorite among collectors. There are about 20,000 recognized forms in North America. To illustrate even a quarter of them in colour is a task that no publisher would risk. So many are monocolorous that exact drawings of structural characters would be needed in addition. The insects range in size from two inches to one-fiftieth of an inch. It has remained for the indefatigable W. S. Blatchley, formerly State Geologist of Indiana, to write the only practical work in the country,—The Beetles of Indiana. While it is confined to actual records from the State it is a fairly good workable list for all the country north of Florida and east of the Mississippi. It does not include the weevils, but a book is shortly to be published by Leng and Blatchley to cover this group of the Eastern United States and Canada. Identification of beetles must depend on the highly technical original descriptions and comparison with proved specimens. Even the checklist of them, Henshaw's Checklist of the Coleoptera, has been out of print for six years, and a successor volume is painfully slow in coming. American beetle study is at least fifty years behind Europe. The great work on classification by Leconte and Horn was published in 1833 and went out of print, *à la* Government publications generally, soon afterwards. It is too highly technical to be read without a glossary and deep pre-acquired knowledge of the subject.

Perhaps in the list of general works there might be included the Glossary of Terms used in Entomology, by John B. Smith, but this volume, while necessary to every advanced student or worker, is not really needed by those who wish to read (even exhaustively) the list of popular works quoted above.

Out of this list of about twenty volumes recommended as of prime importance or interest, one can get a splendid education by the possession of two, leaving the rest to be acquired at leisure, if at all. One must be a general Manual of Entomology, the other some volume devoted to the special field of one's choosing. Moreover no books can be more fascinating than these to any one who has love for the great All Out Doors. The more you have, the more you read diligently, the more enjoyment life shall have for you:

THE OCCURRENCE OF THE GENUS *ACHRYSO-CHARELLOIDEA* GIRAULT IN NORTH AMERICA.

BY A. A. GIRAULT, GLENNDALE, MD.

This omphaline genus is characterized by the two grooves on the scutellum and the 4-jointed club. As regards the latter, there is uncertainty in the following new species; for the distinct terminal spine of the club, although "jointed" or constricted at about its middle, is not articulated, and the club must, therefore, be called 3-jointed with a terminal spine. This throws doubt on the genotype as regards this character. Its description should be verified. I had no opportunity to re-examine the type. The genus structurally is very similar to *Gyrolasella* of the Elachertini, but the body is metallic and the postmarginal vein is slightly longer than the stigmal but not nearly half the length of the marginal. Besides, its habitus is that of *Chrysocharis*; resembling also *Diaul'nopsis*. Marginal vein a little shorter than the submarginal or subequal to it.

***Achrysocharelloidea albiscapus*, new species.**

Female.—Length 0.75 mm.

Aeneous green, the fore wings lightly dusky throughout. Scape white, the legs golden yellow except the coxae. Scaly-reticulated, the scutellum more finely so, the postscutellum and propodeum subglabrous, the latter with weakly indicated median and "lateral" carinae ("lateral carinae" just laterad of the small spiracle). Pedicel intermediate between the funicle joints in length, 1 a little longer than wide, 2 quadrate; club somewhat longer than the funicle, its joints no longer than the funicle joints. Mandibles 4-dentate. Marginal cilia of fore wing somewhat longer than usual (not extremely short, not a seventh of the greatest wing width). Stigmal vein with a distinct neck. Parapsidal furrows distinct, nearly or quite complete. Caudal wings with about seven lines of discal cilia where widest, their longest marginal cilia distinctly longer than those cilia of the fore wing. Pubescence very sparse. Caudal tibial spur single, small.

Described from one female taken in the woods at Hillmead (Glennedale), Maryland, Prince George County, April, 1916.

Type.—Catalogue No. 20298, U. S. N. M., the female on a slide.

October, 1916

DESCRIPTIONS OF AND OBSERVATIONS ON SOME
CHALCIDOID HYMENOPTERA—II.

BY A. A. GIRAULT, GLENNDALE, MD.

Eurytoma pachyneuron, new species.*Female*—Length 1.16 mm

Agrees with the type of *crassineura* Ashmead except as follows: The legs are reddish brown except most of the caudal tibia dorsad and a spot on the caudal coxa, also most of the middle tibia and the caudal femur more or less centrally above; the marginal vein is somewhat longer; funicle 1 is much slenderer and longer, over thrice longer than wide at apex (in *crassineura* only over twice longer than wide); funicle 2 is twice longer than wide (only a third longer than wide in the other species); the size is smaller; the median channel of the propodeum is single (double and wider in the other, no median basin in either). Tegulae, ventral edge and proximal half of scape, reddish yellow. Umbilicately punctate. Petiole short. Abdomen polished above.

Described from one female reared in connection with *Isosoma*, Glendale, California (T. D. Urbahns).

Type—Catalogue No. 20321, U. S. N. M., the above female on a tag, the wings, caudal legs and antennae on a slide with an antenna of type *crassineura* female.

A second female from Halliday, Utah (C. W. Creel) but differing in having the sides of the median channel very finely punctate, the sculpture finer than in the types and the legs entirely reddish yellow.

Xanthosoma nigricornis Ashmead. Genotype.

This is merely an *Eurytoma* with a fine sculpture.

Eurytomocharis minuta Ashmead. Genotype.

Marginal, postmarginal and stigmal veins *subequal*, the stigmal long. Club *solid*. Funicle 1 a little longer than wide, 2 globular, 3–5 each a little wider than long. Caudal tibial spurs double. Otherwise as in *Eurytoma*. Generic characters are the *solid* club and not otherwise. Type examined.

Decatomidea cooki Howard.

This is a varicoloured species of *Eurytoma* and is characterized (besides colours) by bearing a rounded, densely, finely punctate

October, 1916

median basin without a median channel through it. Type examined.

Eurytomocharis eragrostidis Howard.

Congeneric with *minuta* but the venation as in typical *Eurytoma*; marginal vein a third longer than the stigmal, the latter somewhat shorter than the postmarginal. A varicoloured species. Funicle 1 one-third longer than wide, wider distad, 2 quadrate. Type examined.

Eurytomocharis triodii Howard.

A species of *Eurytoma*. Venation as in *E. eragrostidis*. Funicle joints subequal, each about two-thirds longer than wide, subequal to club 1. Abdomen lanceolate, its petiole very short. Propodeal basin finely, densely punctate and with a flat bifoveate median channel through; elsewhere, propodeum coarsely foveate. Type examined.

Eurytoma minnesota, new species.

Female—Differs from *illinoisensis* in having the median channel of the propodeum double for nearly the proximal half, the former is somewhat more slender and the abdominal petiole is longer, approaching quadrate. The species *solenozopheria* Ashmead has the abdominal petiole very short, the abdomen subsessile and the median channel of the propodeum is bifoveate at base only. The three species are very close. The species *solenozopheria*, however, has the median basin of propodeum distinct caudad, there bounded by a V-shaped carina. Petiole finely scaly, tricarinate.

The male has the cephalic tibiae more or less black; funicle 5-jointed.

Described from two males, six females reared from quack, Olmsted, Minnesota (C. N. Ainslie).

Types—Catalogue No. 20322, U. S. N. M., the above specimens, minutien-mounted.

Bruchophagus borealis Ashmead. Genotype.

The postmarginal vein is slightly longer than the stigmal, the latter than the marginal. Antennae as in *Eurytoma*, the club 2-jointed. Caudal tibial spurs double. Segment 2 of abdomen subequal to 4, longest, 5 a fourth shorter. Petiole much wider than long. Propodeum with a nonchanneled, large, concave

median basin which is finely, densely punctate. Otherwise as in *Eurytoma*. From the female type. The species *funebis* Howard differs in coloration but not much otherwise. In *mexicanus*, the marginal vein is distinctly longer than the short stigmal, but the abdominal segments remain about the same as in the genotype; the venation varies somewhat and *mexicanus* should be compared with *funebis* which it closely resembles. However, the scape is reddish at base and the legs differ a little in colour. Types examined.

The male funicle is 4-jointed and this fact with the *shape* of the abdomen are the true generic differentials.

Systolodes brevicornis Ashmead. Genotype.

The female type is missing, but some males (so identified by Ashmead) I am unable to separate from the males of *Bruchophagus funebis* Howard and must conclude that the two are the same.

Specimens of *funebis* were found in the U. S. N. M. collections under the generic label, but they were from Washington, D. C. In the original description of *brevicornis*, Ashmead himself states that the two species are much alike. All other specimens placed under this genus by Ashmead were *funebis* or closely allied to it; none had the fourth abdominal segment greatly enlarged (unless subjectively to some astigmatic observers). The genus *Systolodes* is a subjective abstraction!

Eurytoma binotata Ashmead.

The name of this Japanese species is preoccupied. The new name *nippon* is substituted for it.

Rileya americana, new species.

Female—Length 2.75 mm.

Robust and resembling a large specimen of *Eurytoma*, the abdomen compressed as in the genus. Pronotum longer than the scutum.

Black, the wings hyaline, the venation brown, the legs (except coxæ), scape and tegulæ reddish yellow, the tarsi, knees and tips of tibiæ whitish; abdomen dark reddish except dorsad and the petiole. Flagellum dark brown. Like *cecidomyia* Ashmead but thrice larger, segment 4 of the abdomen is not nearly half the length of 5 as in that species, 3 is much curved circularly, not

transverse, 2 is a round, disk-like plate, the petiole is very short, subobsolete, while the coarse, isolated rugæ on the propodeum are entirely different. Differs from *piercei* in the colour of the legs, the venation is longer in *americana*, the size much greater, propodeum different and so on. Scutellum with a rimmed apex and an obtuse cross-ridge before the apex. Segment 5 of abdomen occupying over half the surface, the abdomen densely scaly except segments 2-3. Propodeum with a pair of coarse, median rugæ which are a little separated at base and parallel there for a short distance (joined by a cross-ruga a short distance out), then widely diverging to run disto-laterad (straight) then abruptly looped up toward the spiracle forming a large semicircle; from the point of change to this loop, a straight, short ruga runs to the apex at the side of the neck (and between the two, one on each side, of these, are about three straight rugæ; a V-shaped ruga runs cephalad from the apex of the loop). Propodeum densely scaly, punctate. Femora darker, reddish toward base. Club 3-jointed; funicle 1 somewhat longer than wide, 2, quadrate; ring-joint 1, quadrate, the others wider. Pedicel slightly longer than funicle 1.

Described from three females in the collection of the U. S. National Museum labelled "5140°. 9-7-91". U. S.

Types—Catalogue No. 20323, U. S. N. M., the above specimens on tags and a slide bearing a caudal leg, a fore wing and an antenna.

Rileyia hegeli, new species.

Female—Length 1.00 mm.

Golden yellow, the wings hyaline, the venation yellow, the following black markings: Pedicel above at base, distal half of scape above, flagellum (brown), scutum (except lateral margins except distad), pronotum distad across meson for a width equal to the black of the scutum, upper centre of occiput, apex of ovipositor, scutellum except lateral and distal margins and the meson of the abdomen broadly from base to beyond middle of segment 5. Postmarginal vein nearly as long as the marginal, over twice the length of the stigmal. Abdomen as in *cecidomyia* but segment 4 transverse-linear, 5 occupying three-fourths of the surface, the petiole very short. Propodeum with a cross-carina between which run longitudinal rugæ from base and from apex. Ring-joints

all cross-linear, 3 widest; funicle 1, quadrate, 5 a little wider than long; pedicel as long as funicle 1. Pronotum shorter than the scutum.

From one female in the U. S. National Museum from Biscayne Bay, Florida (Ashmead).

Type—Catalogue No. 20324, U. S. N. M., the female on a tag, a fore wing, caudal leg and an antenna on a slide.

***Microdontomerus anthonomi* Crawford.**

Lutesville, Mo., (G. W. Barber). Antennæ 13-jointed with one ring-joint; funicle joints subequal but 7 somewhat wider, each about twice wider than long, shorter than the pedicel. The median carina on the propodeum may be doubled or trebled. In three females from the above locality, it was single, double and treble. The propodeum is more or less glabrous along the meson; it was tricarinate at the meson with one of the type females. Fore femur compressed.

***Asympiesiella india*, new species.**

Female—Agrees with the description of the genotype except that only the caudal coxa is metallic at its proximal half, the scape is brownish black except along the ventral margin, the propodeum is scaly, funicle 1 is only a third longer than 4 which is twice longer than wide, the mandibles are 7-dentate; and the male differs in having the caudal coxa (except at apex), the distal half of the caudal femur and the same of the caudal tibia, black; its scape is pale except at apex, the white on the abdomen is confined to the meson; and funicle 4 is not quite twice the length of the club, the latter subequal to funicles 3 and 5. Rami on funicles 1-3, from the base of each, same side.

Head and thorax in both sexes scaly punctate.

Described from two pairs of each sex reared from *Gracillaria soyella*, the Tar Leaf-folder, Pusa, Behar, India, (T. B. Fletcher).

Types—Catalogue No. 20325, U. S. N. M., the specimens on four slides with a female antenna of *Sympiesis dolichogaster* Ashmead.

This Indian species differs from the North American *Sympiesis dolichogaster* Ashmead most notably in having the median carina of the propodeum but half complete and the scape less coloured. The species are congeneric. The validity of *Asympiesiella* must

be left for later treatment. The genotype is shaped like *dolichogaster* and the generic differential may hinge on the greatly elongated abdomen, if the club of *Sympiesis* is not truly 3-jointed and the males do not differ generically. It will do no harm for the present to let them stand but if there is no *true* and *real* difference but only an arbitrary and dermal one, the two must be combined. Here are Australian, North American and Indian species which, superficially, are identical.

Pleurotropis longus, new species.

Female—Length 2.75 mm.

Characterized by the long abdomen which is depressed and conical, distinctly longer than the head and thorax combined; like *perdubius* but the abdomen is more slender and somewhat longer, its segment 2 is glabrous and somewhat longer, the tibiae are black to tips, funicle 1 is more slender, thrice longer than wide, 2, twice longer than wide. Otherwise the same.

Described from one female reared in connection with *Isosoma*, Lafayette, Indiana, (W. J. Phillips).

Types—Catalogue No. 20326, U. S. N. M., the specimen on a tag, antennae and a pair of wings on a slide.

Aphidencyrus inquisitor (Howard).

Many females from *Myzus persicae* on peppers, Norfolk, Virginia, (D. E. Fink), October, 1915.

Asaphes americana Girault.

Norfolk, Virginia, September 3, 1915, from *Aphis rumicis* (D. E. Fink). The caudal coxae may be suffused with yellowish.

Ormyrus unimaculatipennis, new species.

Note—In *Ormyrus* the parapsidal furrows are *distinct*, that is, easily seen but they are delicate, not deep. It is an error to say there are no parapsides. However, these furrows are sometimes subobsolete.

Female—Length 2.85 mm.

Dark metallic green, the scape (except a little at apex above) and legs (except the coxae), reddish brown, the caudal tibiae black, the tarsi white. Fore wings hyaline but with a large, distinct, rectangular (a little longer than wide) fuscous spot under a little less than the distal half of the marginal vein and which touches the apex of the stigmal and extends to the middle of the wing;

postmarginal vein somewhat longer than the nonsessile, curved, stigmal vein. Pedicel twice longer than wide at apex, nearly twice longer than funicle 1, the latter a very little longer than wide, longest yet subequal to 2; 6, twice wider than long; club with the joints (or two divisions) subobsolete. Second ring-joint larger than the first. Head and thorax finely cross-lined, the lines on the thorax not raised. Axillæ, scutellum laterad and the propodeum longitudinally lined, the thorax dorsad (except the propodeum between the spiracles) with prostrate, long pubescence from scattered minute punctures. Propodeum with a pair of widely separated median carinæ. Abdomen glabrous at immediate base, roughly scaly elsewhere; line 1 of large punctures double mesad, base of segment 3; 2, base of segment; 4, double; 3, base of segment; 4, inclined to be triple in places; no others; a median carina from base of segment 3 to middle of 5; segments 3-5 with a scalloped cross-ruga at about middle. Like the Australian species. The basal of the two lines of punctures on abdominal segments is at first of half-punctures but these become more complete distad, complete in line 3.

From one female on a tag in the U. S. National Museum from Louisiana (C. F. Baker).

Type—Catalogue No. 20327, U. S. N. M., the foredescribed specimen and a slide bearing a fore wing and an antenna.

***Habrolepoidea depressa*, new species.**

Female—Length 1.15 mm.

Body depressed, the ovipositor a little extruded yet distinctly so. Dark metallic purple, the wings hyaline, the legs coloured as in *Aphidencyrtus aphidiphagus* (Ashmead) from which this species differs as follows: The mandibles have the third tooth small, subacute (bidentate but the broad second tooth is rather deeply concaved at apex), the frons is moderately broad, the form depressed, the marginal vein is subequal to the stigmal and post-marginal veins. Venation black. Body very finely, microscopically scaly, shining, the axillæ glabrous. Pedicel subelongate, much longer than any funicle joint; funicle joints subquadrate but enlarging distad. Club wider than the funicle and three-fourths its length, obliquely truncate from base of joint 3. Scape with a distinct ventral exfoliation but this is not greatly convexed.

In the male, the band on the middle tibia reaches to the middle, the scape has a distinct convex ventral exfoliation, the pedicel is globular, the marginal vein shorter. The funicle is clothed with rather long, soft hairs, 1 twice longer than wide, 6 somewhat longer than wide; club solid, ovate, somewhat longer than funicle 1, hairy.

Described from two males, three females, reared from the eggs of *Cyllene robiniae*, Morristown, Illinois, December 8, 1914, (J. R. Malloch).

Types—Catalogue No. 20328, U. S. N. M., the above specimens on tags, a head and fore wing of each sex on a slide.

The species is like a *Zooencyrtus* except the shorter club in that genus. It may represent a new group. *Aphidencyrtus* Ashmead may be retained as a group distinct from *Habrolepoidea* only on the ground of a difference in mandibular shape.

***Syrpophagus quadrimaculatæ* Ashmead.**

A synonym of *mesograptæ*. Types compared.

***Habrolepoidea tarsalis*, new species.**

Female—Length 1.10 mm.

Like *depressa* but differing as follows: The scape is cylindrical, slender, the vertex not thin (cephalo-caudad), the form is narrower (moderate in width), the thorax convex, the postmarginal vein somewhat shorter than the stigmal, the scutellum finely longitudinally lined, the abdomen shorter, its ovipositor not extruded. Like *aphidiphagus* Ashmead but the mandibles with the third tooth acute, the scutellum with very fine longitudinal striation (instead of fine scaliness) and the venation is different. Funicle 1 a little longer than wide, 2 a half longer than wide, longest, 6 as long as 1 but wider. Club two-thirds or more the length of the funicle.

Described from two females in the collection of the U. S. National Museum, labelled "*Encyrtus tarsalis* Ashmead. Type. Indiana." The species does not seem to have been described before.

Type—Catalogue No. 20329, U. S. N. M., the above females on tags, a head and fore wing on a slide.

REMARKS ON *LYGUS INVITUS* SAY, WITH DESCRIPTIONS OF A NEW SPECIES AND VARIETY OF *LYGUS*. (HEMIPTERA MIRIDÆ).

BY HARRY H. KNIGHT, ITHACA, N. Y.*

The writer has spent considerable time during the past three seasons making observations on the life history and food plants of many species of *Miridæ* and particularly in the genus *Lygus*. The writer is also concluding work on a monograph of the genus *Lygus*, but for the benefit of certain economic workers interested in the forms here considered this small contribution is published in advance.

In the past *Lygus invitus* Say has been the name generally applied to the members of a small group of species, which on careful study based upon distinctive structures furnished by the male genital claspers, are readily and consistently separated. Thomas Say described *invitus* in 1831 and in his usual style this early worker brought out certain characters that will distinguish the species from all others. After a careful study of some forty species of *Lygus*, I wish to point out a distinctive combination of characters mentioned by Say and not exhibited by any other form thus far brought to my attention. The following is taken from the original description: "*C. invitus*—Dark livid or blackish; beneath green with a blackish lateral vitta." "Head . . . with an impressed longitudinal line . . . scutel with a pale, obsolete vitta, beyond the middle . . . beneath green, with a broad lateral black vitta."

After careful search for food plants I find that *invitus* breeds only on the elm, preferring always the young, thrifty plants with succulent shoots. The nymphs are pale greenish, hatching soon after the leaves come out in the spring from eggs that were inserted in the twigs the previous July. One can scarcely distinguish the nymphs from those of the species described below and which is well known as a pest on the pear. The nymphs are, however, smaller and more slender than those of the false

* Contribution from the Department of Entomology of Cornell University. October, 1916

tarnished plant-bug. In a previous article, (Jour. Ec. Ent., vol. 8, p. 296, 1915) the writer described the manner of oviposition of the false tarnished plant-bug which is the same insect as *communis* described below, while the reference to this species breeding on elm refers to the true *invitus* of Say.

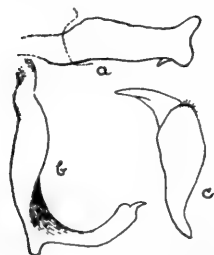


Fig. 16. *Lygus invitus* say, male genital claspers; a, lateral aspect of the sinistral forcep; b, sinistral forcep dissected, dorsal aspect; c, dextral forcep dissected, ventral aspect.

The male claspers of *invitus* show a close similarity to those of *communis*, but the practiced worker will note certain constant differences, and which are exhibited in the drawings (figs. 16, 17). The absence of a spine on the inner curve of the dextral forcep of *invitus* will distinguish this species

at once from *communis*.

Lygus communis n. sp. Easily distinguished from *invitus* by the two black rays on the disk of the pronotum and by reddish in the lateral stripe on the body. Differs structurally in not having the impressed longitudinal line on the vertex and in the form of the male claspers.

Male—Length 5.5 mm. *Head*: width across the eyes, 36*; width between eyes, 15; length (lateral measurement) 14; height at base, 22; yellowish brown or greenish marked with reddish; basal half of the tylus, arched portions of the juga, loræ, and bucculæ marked with reddish, also the front frequently marked with red in the form of transverse lines; apical half of the tylus dark brownish to fuscous; vertex full, without an impressed longitudinal line as in *invitus*, but having a slight triangular, flattened space just before the carina; eyes dark brownish, sometimes faded to pale on the

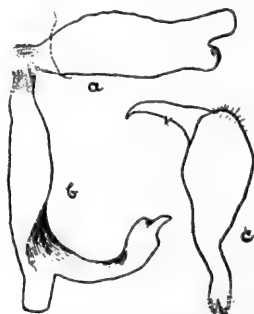


Fig. 17. *Lygus communis*, male genital claspers; a, lateral aspect of sinistral forcep; b, sinistral forcep dissected, dorsal aspect; c, dextral forcep dissected ventral aspect.

* Measurements for the head, antennæ and pronotum are given in micrometer readings which for comparison are more useful than figures given in millimeters. To reduce these measurements to millimeters multiply by .0285.

margins. Rostrum reaching to near the posterior margin of the hind coxæ, yellowish to brownish, the apex blackish.

Antennæ: segment I, length 20, greenish, frequently darkened with brownish; segment II, length 70, dark brownish to fuscous, sometimes basal half paler; segment III, length 42, dark brownish; segment IV, length 38, same colour as the preceding; all the segments with very fine, pale yellowish pubescence.

Pronotum: length 33, width at base 62, apex 32, width of collar 24; greenish, darkened with brownish on the basal half, two blackish rays on the disk, one behind each callus, in the darkest specimens extending across the calli, widening behind and nearly reaching the basal margin; coxal cleft marked with reddish, sides just posterior to this much darkened; disk shining, very finely and closely punctured, the punctures more or less transversely confluent especially on the basal half. Scutellum greenish darkened with brownish, transversely rugose; specimens maturing on *Ilex* and *Cornus* frequently have a longitudinal median fuscous line. Sternum pale beneath with the sides reddish as are the lateral parts of the meso- and metathorax.

Hemelytra: greatest width 2.3 mm., closely and minutely punctured, with fine yellowish pubescence; dark brownish to fuscous, darker on the apical half of the corium and across the tip of the embolium; embolium except the tip, the base and narrow lateral margin of the corium, pale greenish; cuneus clear, tinged with yellow, the very tip sometimes slightly darkened; membrane darkened with fuscous veins and narrow margin at the apex of the cells and bordering the cuneus, a spot along the margin beyond the apex of the cuneus and extending inward to the cells, clear, thus isolating a fuscous spot along the margin close to the apex of the cuneus.

Legs: coxæ pale, usually with a spot of reddish at the base, femora greenish to yellowish, the posterior femora and often the intermediate pair twice annulated near the apex with reddish, frequently the whole apical half quite reddish; tibiae greenish, sometimes slightly darkened toward the tip, spines pale brownish, tarsi yellowish to brownish, darker at the apex.

Venter: pale greenish beneath, a broad lateral band and the genital segment, dark reddish with brownish. The male claspers

are distinctive for the species (fig. 17). The spine shown on the dextral forcep is not present in *invitus*, and is usually visible in pinned specimens without dissection.

Female—Slightly broader and more robust than the male, does not differ materially in coloration though usually paler than the male.

This is the species commonly known as the false tarnished plant-bug, and is a destructive species to the cultivated pear. For an account of the life history see Parrott and Hodgkiss 1913*. The species is found most commonly breeding on *Cornus*, particularly *C. stolonifera* and *C. paniculata*. I have also reared specimens from *Cornus alternifolia* and *Ilex verticillata*, and taken general specimens on the prickly ash (*Zanthoxylum americanum*).

The type specimens were collected by the writer on pear near Batavia, N. Y., July 4, 1914.

Paratypes: 67 specimens taken on pear, June 16 to Aug. 8, Batavia; 35 specimens from *Cornus stolonifera*, June 14 to Aug 6, Batavia; from *Cornus paniculata*, 5 specimens June 21, 10 specimens Aug. 1, 6 specimens Aug. 10, Batavia. From *Cornus alternifolia*, 16 specimens, June 25 to 29, Batavia; 3 specimens, June 25, Wyoming, N. Y.; 8 specimens, June 21, Portage, N. Y.; 3 specimens, July 27, McLean, N. Y.; from *Ilex verticillata*, 15 specimens, June 21, Batavia, N. Y. Miscellaneous specimens: 16 from near Batavia, N. Y., June 25 to 29; 7 specimens, June 27, Portage, N. Y.; 5 specimens, July 5, Four Mile, N. Y.; 2 specimens, June 13, and 3 specimens, July 24, Ithaca, N. Y.; 3 specimens, June 23, Conesus Lake, N. Y., all collected by the writer. Specimens from other collectors: ♀, June 25, Spring Brook, N. Y.; ♂, July 2, Hamburg, N. Y.; ♂ ♀, July 20, Salamanca, N. Y.; ♂, June 30, Bretton Woods, N. H., collected by Mr. E. P. Van Duzee; 2 ♂♂ June 22, Bennington, Vt.; ♂ ♀ July 15, Eastport, Me.; ♀, July 12, Capens, Me.; 2 ♂♂, July 15-24, Glen House, N. H., collected by Mr. C. W. Johnson. Male specimen from Fort Collins, Colo., Aug. 1, with an unusual amount of reddish on the body beneath.

* The False Tarnished Plant-bug as a Pear Pest, New York Agr. Expt. Sta. Bull. 368.

Lygus communis var. **novascotiensis** n. var. Paler and more slender than the typical *communis* but not differing materially in the male claspers. Breeds abundantly on apple in Nova Scotia; but in New York I have been unable to take any form of *communis* on the apple.

Length 5.3 mm., greatest width 2 mm., more slender and much paler than the typical *communis*; the two black rays on the pronotum small but distinct; hemelytra more yellowish brown than fuscous; lateral stripe of the body reddish or darkened with fuscous.

This is one of the varieties or races of *communis* which may be worked out from the forms inhabiting different plants, and perhaps influenced somewhat by different external conditions.

Described from several specimens received from Mr. Wm. H. Brittain, of Truro, Nova Scotia, collected from apple at Kentville, Wolfville, and Smith's Cove, Nova Scotia, July 6 to 28, 1915.

GEOMETRID NOTES.

ON THE GENUS *XANTHORHÖE* HÜB. (*PETROPHORA* HÜB.).

BY L. W. SWETT, WEST SOMERVILLE, MASS.

The names *Xanthorhœ* Hüb. and *Petrophora* Hüb. have been used interchangeably, but *Petrophora* Hüb. ("Tentamen," 1805) has priority over *Xanthorhœ* Hüb. (Verz. bek. Schmett., 1816). The majority of European specialists are dropping the use of the "Tentamen" as they regard it more or less in the nature of a circular letter of doubtful date and place. Those who care to go farther into the matter should consult the excellent work of L. B. Prout and C. D. Sherborn (Annals and Magazine of Natural History, ser. 8, vol. IX, Jan., 1912); also Scudder (Proc. Am. Acad. Sci., vol. X, pp. 91-293, 1875), C. H. Fernald (Amherst, Mass., 16 pp., 1905), and Sherborn and Durant (Ann. Mag. Nat. Hist., ser. 7, Vol. II, pp. 491-495, Dec., 1898.)

The first species I propose to consider is *defensaria* Guen. (Spec. Gen., vol. X, p. 411, 1857; also Packard, Monograph, p. 149, 1876). This species was described from a male taken in California. Guenée says "near *munitata* Hüb. and especially *convallaria*, but more obscure," etc. The form that agrees most closely with this description—and I have examined some 400

specimens, including those of my own collection, that of Mr. E. H. Blackmore, the Museum of Comparative Zoology, Cambridge, Mass., and the American Museum of Natural History, New York—is the male with a dark, greyish outer border on the fore wings and a rather indistinct, brownish median band, beyond which are rows of triple dots on the veins, with traces of wavy lines. The female differs from the male in that the band is of a solid, dark, reddish-chocolate colour, the outer border is dark fuscous gray, and the hind wings are darker basally and have several undulating lines but not so many as the fore wings. When these wavy lines are rubbed they show only as points on the veins, and it was doubtless a rubbed specimen that formed the basis of Guenée's description. Both the male and the female belong to what I term the normal summer form, occurring from July 3 to August 30, according to my series.

Xanthorhœ defensaria in all its forms can be separated from *convallaria* in that the basal line of the latter has a very strong, regular, outward curve, where in *defensaria* it runs almost straight, in a more or less shaded line, to the inner margin. They average between 20 and 25 mm. in expanse in my series, only one or two measuring below 20 mm. and about the same number over 25 mm., but none above 27 mm.

I think this typical, normal, summer form with the gray outer margin can be readily recognized by this description. I have specimens of it from British Columbia and California. This typical form represents the second brood, there being an early spring brood which I shall discuss later. There are several varietal forms of the summer brood. Packard (Proc. Boston Soc. Nat. Hist., vol. XIII, p. 398, 1871) describes "*Xanthorhœ (Coremia) californiata*, one female, Edwards, from California" as new. In the material studied there is a specimen bearing this label and a small, round, punch label, "No. 1385." Beneath this on a large label is written "figured in Monog." in Packard's handwriting. This is undoubtedly Edwards' female, from California, and is not a variety of *munitata* Hüb., but of *defensaria* Guen. (See Packard's Monograph, p. 137, 1876). He evidently mixed *munitata* Hüb. and *defensaria* together, as he remarks on the peculiarities of the Labrador specimens. The specimen of *californiata* Pack.

(pl. VIII, fig. 67) which is in the Museum of Comparative Zoology, and undoubtedly represents the type, is the bright, red-banded form with gray outer margin to the fore wings. Hulst (Can. Ent., vol. XXXII, p. 104, 1900) described a very similar form as *Xanthorhœ* (*Hydriomena*) *amorata* from two specimens. Dr. Dyar (Proc. Ent. Soc. Wash., vol. VI, p. 223, 1904) refers *Hydriomena amorata* Hulst, male and female, to *defensaria* Guen. Mr. J. Grossbeck (Ent. News, pp. 147, April, 1907) states that there are two forms, probably both females, and although he refers both of these to *Xanthorhœ* (*Petrophora*) he retains the female with the bright, red, central band as the var. *amorata* Hulst, in view of the fact that it was so distinct. Evidently Dr. Dyar was in error when he said "male and female." In this var. *amorata* Hulst, the fore wings have a bright, red-brown, central band and a normal gray, outer border. I see no reason why the name *amorata* Hulst should not fall before the older name *californiata* Pack. I have compared one of Mr. Grossbeck's specimens with the type and, except that the central band is not quite so bright, they are identical. It is a matter of individual opinion as to whether *amorata* is worthy of being retained to designate an intermediate varietal form, or fall into the synonymy of *californiata* Pack. I am inclined towards the latter view.

The next variety of the summer form to be considered is the melanic or black-banded form, which I previously described as *mephistaria* Swett (Can. Ent., vol. XLVII, p. 157, May, 1915). There are a few errors here that I must have made in copying the dates, and should be corrected, as follows:—

Line 23, for *Jan. 9* read *July 9*; line 24, for *Feb. 3*, read *July 3*.

I doubt if any of these forms are ever found at such early dates as are thus erroneously given in this connection.

This black-banded form is the same in size as the typical form and is represented in both sexes, whereas I have seen the bright, red-banded form, *californiata* Pack., only in the female, though I see no reason why males should not be found. I believe this range of coloration from reddish chocolate through light red to black occurs in nearly all species of *Xanthorhœ*, e. g., *ferrugata* Clerc. and its black-banded var. *unidentaria* Haw.

Still another extreme form of the typical *defensaria* Gn. remains without a name, and I propose to describe it as follows:—

Xanthorhõe defensaria Gn., var. **conciliaria**, var. nov.

Expanse 23-25 mm. Wing pattern same as in normal *defensaria* Gn. except that the bands are a very deep reddish chocolate, the fore wings are basally yellowish and the outer margin is a reddish yellow or ochre. This yellow, suffused variety corresponds to the yellow variety of *munitata*, (*hethlandica* Prout). Doubtless this variation occurs in most of the *Cidaria* group allied to *munitata* Hüb. The white-banded spring form also shows this variation, but I think it does not differ sufficiently from *conciliaria* to receive a separate name. The dark-red, central band is lighter than normal and the wavy lines of the outer margin are present, but are reddish instead of fuscous.

This variety is very distinct. I have it only from Victoria, B. C., though no doubt it is common in Alaska. In some specimens the outer margin is entirely ochreous without markings except the marginal white line and two marginal white dots opposite the angle of the extradiscal line.

Holotype.—♂, Victoria, B. C., July 23, 1914, E. H. Blackmore; in my collection, received through the kindness of Mr. Blackmore.

Allotype.—♀, Victoria, B. C., Sept. 18, 1913, in collection of Mr. E. H. Blackmore.

Paratypes.—1♂ 6♀'s, Victoria, B. C., May, 14, 1914, to Aug. 26, 1914 and 1915, collection of Mr. Blackmore; also 5♀'s, Victoria, B. C., April 30 to Aug. 27, 1914 and 1915, Messrs. A. J. Croker and E. H. Blackmore, in coll. Swett.

There is a possible third brood which is found in the late fall up to October 1st. This is very small and stunted, and there is a tendency for the median band to be very narrow. The central band is of the same colour as in the normal male but is more solid and less distinct. This form is certainly worthy of a name and may be described as follows:—

Xanthorhõe defensaria Gn. var. **thanataria**, var. nov.

Expanse 18-20 mm. The bands are of the same shape as in the normal form but tend to be very narrow. Basally the male is pale ashen without lines, the central band dark and almost solid, in some specimens showing irregular lines. Outer margin very

pale ashen without lines, except the irregular scalloped marginal lines and black, twin spots. Hind wings somewhat semi-diaphanous, shaded with fuscous, with a pale extradiscal line basally. The females are of the same size and general appearance but the central band is lighter, being of about the same colour as in var. *californiata* Pack., sometimes with a yellowish tinge. Outer border light ashen, a little paler than the normal form, lines faintly discernible. I believe that a form corresponding to this is represented in the other allied *Cidarias*.

Holotype.—♂, Victoria, B. C., Aug. 1, 1915, E. H. Blackmore; in my collection, received through the kindness of Mr. Blackmore.

Allotype.—♀, Victoria, B. C., Sept. 9, 1914; in collection of E. H. Blackmore.

Paratypes.—3 ♂'s 1 ♀, Victoria, B. C., Aug. 26 to Sept. 25, 1913 and 1914, in collection of E. H. Blackmore; also 1 ♂ 1 ♀ from same locality. Sept. 5 to 25, 1913 and 1914, in my collection.

This form is easily distinguished by its small size, lack of markings and narrow median band besides the other points enumerated.

***Xanthorhœ defensaria* Gn., var. *gigantaria*, var. nov.**

Under this name I propose to describe the typical early spring form, which may be easily recognized by its large size, heavy markings and wide bands.

Expanse 27-31 mm. The male has the general appearance of the male of the smaller summer form but differs in the following points:—Size much larger; median bands broader and heavier; basal line black or dark brown and very wide, in fact so wide that it generally merges with some part of the extradiscal line and gives somewhat the appearance of a more or less suffused median band. In the normal *defensaria* the basal band appears to start, as a rule, below the costa, but in the present variety it runs from costa to inner margin. The ♂ holotype has no lines on the outer border, merely a few black points on the veins. There is the usual irregular marginal white line, beyond which the outer margin is dark. In some of the other specimens, however, the outer border varies from the normal gray, with many wavy lines, to a slightly yellowish shade; but the latter is uncommon.

The female is as large and as striking as the male, the median

band is extremely wide and very dark and heavy. Between the basal band and the extradiscal the wing is so dark that only a broad, dark, intermediate band can be discerned. The median band is very deep reddish chocolate in colour. The outer border appears to be almost as in normal *defensaria* except that the lines are heavier. The hind wings of both sexes seem to have a slightly more yellowish shade than in the normal form, particularly in the female, which in normal *defensaria*, is quite dark ashen. Beneath there appears to be little difference except that the lines are heavier in the variety.

This form does not appear so commonly in collections as one might expect, possibly because collectors neglect to start their work early enough in the season.

One would hardly imagine this form was *defensaria* unless it were seen in series.

Holotype.—♂, Cowichan Bay, B. C., April 26, 1906, in my collection, received through the kindness of Mr. F. H. Wolley Dod.

Allotype.—♀, Victoria, B. C., May 10, 1914, collection of Mr. E. H. Blackmore.

Paratypes.—5 ♂'s, April 21 to May 8, 1914 and 1915, 4 of them in Mr. Blackmore's collection, the fifth (with a somewhat intermediate, reddish, outer border; without date of capture) in the Victoria Museum collection; 2 ♂'s, Duncan, B. C., April 22, 1914, Victoria, B. C., April 25, 1914, E. H. Blackmore, in coll. Swett; 2 ♀'s, Victoria, B. C., April 25 and 30, 1914 and 1915, E. H. Blackmore, in coll. Swett; 5 ♀'s, Victoria, B. C., April 22 to May 20, 1914 and 1915, in coll. Blackmore.

Another very interesting variety of this spring form, which I believe to be a case of melanism, is the following:—

Xanthorrhoe defensaria Gn., var. **suppuraria** var. nov.

Expanse 25-27 mm. The male has light ashen fore wings with very faint, wavy lines on the outer border and a very wide, black or reddish-black central band, nearly twice as broad as in var. *mephistaria* Swett. The female is similar to the male, except that the outer margin is of a pale, flesh colour with only the twin, black dots showing strongly. The hind wings are of rather a pale ashen colour and thin in texture, though not so much so as in var. *thanataria* Swett.

This appears to be a rare form and is much like *mephistaria* Swett except for the differences noted, viz., the wider, heavier median band and different shade of colour. In this variety, as well as *mephistaria*, the central band is solid black or reddish black, and the extradiscal and intradiscal lines can barely be seen.

Holotype.—♂, Victoria, B. C., April 25, 1915, E. H. Blackmore, in coll. Swett.

Allotype.—♀, Victoria, B. C., May 2, 1915, in coll. Blackmore.

Paratypes.—♂, Victoria, B. C., April 25, 1915, in coll. Blackmore; ♂, Victoria, B. C., June 2, 1914, E. H. Blackmore, in coll. Swett.

This includes all the forms of *Xanthorhœ defensaria* that might lead to confusion and they are connected by every intergradation, but I think it worth while only to describe the extreme forms, where I have a good series.

Summary of the varieties of *Xanthorhœ defensaria* Guen:—

	Time of appearance	Med. band of fore wing.	Outer border or outer third of fore wing.
<i>X. defensaria</i> Gn.	July 3—Aug. 31. (summer form).	Reddish chocolate (♀), Light brown suffused with blackish (♂).	Dark gray.
1. <i>Var. californiata</i> Pack.?— <i>amorata</i> Hulst.	July 3—Sept. (summer form).	4. Bright reddish brown (♀). ♂ unknown, probably like typical form.	Light gray.
2. <i>Var. conciliaria</i> Swett.	July 23—Sept. (summer form).	18. Reddish cinereous, al- most blackish (♂ ♀).	Ochre yellow, (also basally).
3. <i>Var. mephistaria</i> Swett.	June 6—Aug. (summer form).	1. Solid black or reddish black (♂ ♀).	Light ashen gray.
4. <i>Var. thanataria</i> Swett.	Aug. 1—Sept. (Chiefly Sept.—fall or late summer form).	25. Very narrow, lighter than typical, small sized (♂ ♀).	Pale ashen, almost without markings, more or less diaphanous.
5. <i>Var. gigantaria</i> Swett.	April 29—May (spring form).	22. Very wide, dark reddish brown (♂), dark red- dish brown to cinereous (♀).	Dark gray.
6. <i>Var. suppuraria</i> Swett.	April 15—May (spring form).	2. Very wide black or reddish black (♂ ♀).	Pale ashen gray, some- times ochreous tinge.

These times of appearance are only approximate but give the dates of my series. Whether *thanataria* Swett is a late summer form or a third brood is a question which can only be answered by breeding.

I believe these forms will be easily recognized, and fewer mistakes will be made in the future. Packard evidently did not have a clear conception of *Xanthorhœ munitata* Hüb., or *defensaria* Guen., for he mixed the species badly on plate VIII of the Monograph. Fig. 66 of this plate does not represent *munitata* Hüb., as Packard states, but male *defensaria* Guen. Fig. 67 of the same plate is not *munitata* var., as stated, but female *defensaria*, probably var. *californiata* Pack. *X. munitata* Hüb., has the intradiscal line strongly outcurved, where in *defensaria* it is nearly straight. Fig. 72, Pl. VIII, of the Monograph, appears very close to *munitata*, but there is always a doubt when figures are uncoloured.

Dr. Dyar discusses *X. defensaria* in Proc. U. S. National Museum, vol. XXVII, pp. 779-938, 1904. Mr. Wolley Dod compares *defensaria* and *munitata* in Can. Ent., vol. XXXVIII, p. 254, 1906.

In conclusion, I wish to thank Mr. E. H. Blackmore for the loan of specimens and valuable assistance, and Mr. H. Weiss for useful information and assistance in comparing *X. amorata* Hulst with *defensaria* Guen.

SOME MUSICAL ORTHOPTERA* AT CLARENDON, VIRGINIA.

BY H. A. ALLARD, WASHINGTON, D.C.

Miogryllus saussurei Scudd. In June, 1914, the writer captured several individuals of this small cricket in the short, matted grass of the dooryard of his home. These crickets appear very shy and are rather solitary in their habits. Their stridulation is a brief, rather faint, high-pitched, intermittent trill—tiii, tiii, tiii—very much resembling the intermittent trills of some species of *Nemobius*.

Anurogryllus muticus DeGeer. In early June, 1914, the writer found great numbers of these crickets in a small pine grove on a hillside just behind Mr. Able's house near Vinson Station. These

* The Orthoptera listed in this paper were kindly identified by Mr. A. N. Caudell of the U. S. National Museum.
October, 1916

crickets appear to be somewhat arboreal in their habits, and were always seen upon the trunks of the pines from one foot to eight feet above the ground. They were never observed upon the ground, unless disturbed and forced to leap from the tree trunks. Very often several crickets could be seen upon the trunk of one small tree. The stridulations of these interesting crickets were heard about sundown and in the early part of the night. These crickets appeared to be very susceptible to weather changes and were heard only on very warm evenings.

The trill is loud, continuous, high-pitched, very much resembling the trill of *Æcanthus quadripunctatus* or *Æcanthus nigricornis*. In fact, when the writer first heard these crickets he was inclined to believe he was listening to some species of *Æcanthus*. Although in early June, 1914, *Anurogryllus muticus* appeared to be very common in the pine grove mentioned, none were heard a month later. They were not heard in this grove in 1915. This species appears to be very uncommon in this region and has not been located at any other point.

Nemobius carolinus Scudder. This tiny *Nemobius* is very common beneath the leaves and grass of the roadsides throughout the summer. Its stridulation is a weak, continuous trill indefinitely prolonged. Great numbers of these crickets were trilling everywhere beneath the herbage of the roadsides in 1915. They are persistent singers and may be heard throughout the night. In the coolness of the early morning they appear to be especially musical. They keep well concealed beneath the dead and matted herbage, and are exceedingly difficult to capture.

Neoconocephalus robustus crepitans (Scudder). This cone-headed grasshopper is a very common species around Clarendon, Virginia, in August. If the evenings are warm and humid, their stridulations may be heard from sundown until well into the night. The stridulations of this insect are somewhat puzzling. Two well marked notes may be identified. The stridulations of the majority of individuals around Clarendon and Washington consist of a rather weak, continuous, snappy z-z-z-z-z-z. Occasionally, however, other individuals produce an entirely different note which is exceedingly loud, penetrating, and continuous, with a

peculiar, droning, buzzing whirr, and may be heard for long distances. So different are these notes that the writer was convinced he had captured another species. During the summer of 1915, several individuals of both groups were taken. Although it was first thought that those individuals characterized by the stronger note were generally larger and possibly came closer to *N. robustus robustus*, it was finally decided to refer all to the form *N. robustus crepitans*.

The question is not solved, however, and needs further investigation. Such well marked differences cannot possibly be associated with temperature relations, as the two stridulations may be heard in the same vicinity at the same time. The stronger note is far less commonly heard. Occasionally, stridulations somewhat intermediate between the two extremes may be heard.

Rehn and Hebard* find that the *N. robustus robustus* and *N. robustus crepitans* intergrade within very narrow limits (Ocean View, New Jersey; and Philadelphia, Pennsylvania) although intermediate material has been found as far south as the District of Columbia. It is interesting to note that Davis has noted differences in the stridulations of the two forms; the stridulations of *robustus* appearing to be louder than the stridulations of *crepitans*. Rehn and Hebard have noted a day song, or "sleep-song", for *N. robustus robustus*. They say: "This day song, or what might well be termed, sleep song, is in reality a brief and drowsy impulse giving just sufficient energy to the act of stridulation to demonstrate the sound produced when the vibrations are not at full speed, the irregularity of the sound resulting from the same cause." The writer has noted a similar drowsy, half-hearted day song in the case of *Neoconocephalus retusus* (Scudder).

It would be very interesting to determine to what extent hybridization could be brought about between typical forms of *robustus* and *crepitans*. It is possible that hybrid material would throw much light upon the exact status of these forms.

* "A synopsis of the Species of the Genus *Neoconocephalus* found in North American North of Mexico." Trans. of the Am. Ent. Soc. Vol. XL, No. 4, p. 365-413.

NEW SPECIES OF NEW ENGLAND SARCOPHAGIDÆ.*

BY R. R. PARKER, BOZEMAN, MONT.

Sarcophaga bullata, n. sp.

1913. *Sarcophaga georgina*** Felt, N.Y. State Museum, Bull. 165, Rept. State Entomologist for 1912, pp. 80-82, pl. 7, figs., 1, 2 and 3†. Habitats; description of larval habits and of puparium.

1914. *Sarcophaga* sp., Parker, Can. Ent., vol. 47, p. 422. Related to *S. cooleyi* R. Parker.

Types—Massachusetts Agricultural College, one male, one female.

Paratypes—Massachusetts Agricultural College, 1 ♂, 1 ♀; United States National Museum, 1 ♂, 1 ♀ (No. 19167); American Museum of Natural History, 2 ♂, 3 ♀; Boston Society of Natural History, 2 ♂; Cornell University, 1 ♂, 1 ♀; collection of J. M. Aldrich, 1 ♂, 1 ♀; collection of writer, 6 ♂, 5 ♀.

(♂) Third antennal segment two and one-half to three and one-half times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; all tarsi shorter than their respective tibiae; anterior and posterior faces of posterior tibia with an equally strong beard of long, coarse, black hairs; hairy vestiture of lower surface of middle tibia increasing in length distally, short and not forming anterior and posterior beards; ventral surface of anterior coxa completely clothed with bristles that may be divisible into three irregular rows; only last two pairs of posterior dorsocentrals strong; except at sides, second and third ventral plates clothed with short, decumbent hair; genital segments dull orange, first either with hair-like, or weak marginal bristles.

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.

** Provisionally determined.

† Figure 4, labelled as the genitalia of this species, is of *Phormia regina* (Meigen).

October, 1916

(♀) Third antennal segment two to three times length of second; anterior portion of cheek clothed with black, posterior with whitish hair; hairs fringing calypters dark at fold, otherwise whitish except that those on inner portion of margin of upper (anterior) calypter are often dark; ventral surface of anterior coxa with other bristles than those of the irregular rows at each side, sometimes more or less distinct row between them; only last two pairs of posterior dorsocentrals strong; abdomen clothed with short, reclinate bristles; genital segments slightly protuberant; the two broad, lateral lips of the first genital segment dull orange, near their edges usually turned abruptly backward (more protuberant), spiracles nearest to anterior margin: fifth segment not discernible, its spiracles when visible seem to open through lips of notum sixth (first genital segment); ventral plates of genital segments usually concealed.

Length—9 to 15 mm., average 12 to 14 mm.

(♂) *Head*—Viewed from side parafrontals and genæ, with dark reflections. Breadth of front at narrowest part from one-half to four-sevenths eye width; cheek height varies from one-third to one-half that of eye. Front rather prominent, sides of frontal vitta usually parallel but often slightly convergent backward or the sides effaced just below ocellar triangle (especially in large specimens). Second antennal segment brownish at tip, rarely blackish throughout; third two and one-half to three and one-half times length of second, its inner, basal portion often pinkish or salmon-coloured; arista plumose to beyond the middle. Back of head somewhat convex, typically with two complete rows of black cilia beyond eyes, sometimes with a partial third especially dorsally, otherwise clothed with whitish hair that completely covers metacephalon. Anterior portion of cheek clothed with black, posterior with white hair. Gena sparsely clothed with short hair or sometimes with three irregular rows on that half nearest eye orbit.

Chætotaxy—Lateral verticals absent; vibrissæ inserted just above line of oral margin.

Thorax—Metanotum clothed with short, quite erect, close set bristles. Hairs covering anterior spiracle dark brown basally, at least their outer halves yellowish; those of anterior margins of

posterior spiracle either entirely dark brown or with yellowish tips, those of spiracular cover vary from brown with yellow tips to almost wholly yellowish. Epaulets dark.

Wings—Bend of fourth vein normally a strongly acute angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa equals approximately one and two-thirds times section V; posterior margin of alulae with or without fringe of hair; calypters whitish, fringe of hairs dark, otherwise whitish, but those on inner portion of margin of upper (anterior) calypter often dark.

Legs—Dark; all tarsi shorter than their respective tibiae. Posterior trochanter with well defined "brush," especially in large specimens: femur sub-cylindrical, clothed beneath with long hair that often becomes beard-like posteriorly; anterior face with three rows of bristles, those of intermediate row shortest and not developed distally; posterior face without ventral row of bristles; tibia sometimes slightly curved, anterior and posterior faces each with an equally strong beard of long, coarse, black hair: fourth segment of tarsus at least one-half fifth. Middle coxa with a single row of bristles: femur clothed beneath on posterior proximal half or more with long hair; anterior ventral row of short bristles complete, posterior row represented only by "comb" extending proximally to the long hair: hairy vestiture of lower surface of tibia increasing in length distally but short and not forming anterior and posterior beards; submesotibial bristle present. Ventral surface of anterior coxa completely clothed with bristles that are sometimes separable into three irregular rows, one at each side and an intermediate that is usually less complete and sometimes indistinct.

Chaetotaxy—Anterior dorsocentrals short, slightly longer than vestiture of praescutum but slightly reclinate and not projecting above it; acrostichals absent; inner presuturals, if present, very weak: last two pairs postsutural dorsocentrals strong, anterior to these three or four pairs that are weaker than those before the suture; praescutellar acrostichals present: scutellar apicals present: usually three sternopleurals, sometimes two but generally only on one side: lower sternopleura with a single row of bristles.

Abdomen—Oval or somewhat conical; nota clothed above with short reclinate bristles, beneath with slightly longer, almost erect hair. Ventral plates, as a whole, with their sides converging posteriorly; vestiture of first long and erect, that of second and third short and decumbent except at sides. Posterior margin of fourth notum dorsally, also sometimes ventrally, usually of same colour as genital segments, sometimes not so coloured.

Chaetotaxy—Second segment without marginal bristles; third with two, often very stout; fourth with complete row ending ventrally in long hairs.

Genital Segments—Prominent, often completely exposed, dull orange. First, (g. s.1) large, often partially yellowish pollinose, vestiture slightly shorter than that of second, "humps" almost bare, in profile weakly curved, marginal bristles weak or hair like; second (g. s.2) rotund, not flattened, anal area small and not extending above middle of posterior surface. Forceps (f.) darkened at least on distal half, in profile the fine, hairy vestiture is seen extending almost to tips of prongs, which are strongly curved forward and approximated almost to tips but latter slightly spread; base with upward flap-like extensions clothed with fine hair that is slightly shorter than vestiture of second segment. Base of fourth ventral plate usually shows as a rounded ridge the posterior extremity of which is slightly knobbed showing prominently in profile, inner portion of lamellæ at base thickly set with short, stubby bristles forming a "brush."

Genitalia—Distinctive. Accessory plates (a. p.) hairy; anterior claspers (a. c.) scarcely longer than posterior. (p. c. = posterior claspers; p. = penis.)

(♀) Females differ from males in the following important characters.

Head—Breadth at front at narrowest part varies from about five-sixths to same as eye width. Upper, inner orbits of eyes diverging downward.

Thorax—Bristly vestiture shorter.

Legs—All tarsi equal in length to tibiæ. Posterior trochanter with slender apical bristle: femur spindle-shaped; anterior face essentially with but two rows of bristles, those of lower row few and well separated, intermediate row may be represented by two

or three bristles proximally; posterior face with ventral row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete but bristles weak and inconspicuous distally: submesotibial bristle very strong, sometimes a short bristle just above it.

Chaetotaxy—Anterior and anterior postsutural dorsocentrals shorter: usually three sternopleurals, sometimes four on one or both sides: lower sternopleura with a single row of bristles, often with several others just anterior to its lower part, otherwise clothed with hair.

Abdomen—Oval; vestiture practically throughout of short, reclinate bristles.

Genital Segments—Slightly protuberant, visible only from beneath or sometimes bristles of first segment may be seen from above. The two broad lateral lips of the first genital segment distinctly separated dorsally, their edges usually abruptly turned backward and fringed with bristles that decrease in length and size ventrally, dull orange, often yellowish pollinose, spiracles nearer to anterior than posterior margin. Fifth segment not discernible as such, its spiracles rarely visible and apparently open through lips of sixth segment (first genital). Ventral plates of genital segments concealed.

Described from 15 males and 12 female specimens, 62 others examined.

Range—New England: MASS.: Woods Hole, Cohasset, Gloucester, Rockland, North Abington, Andover, Forest Hills, Wellesley, Amherst, Springfield; ME.: Fryeburg, Capens; CONN.: New Haven.

United States—N. Y., N. J., N. C., Ga., Fla., La., Ill., Ohio, Ind.

The fact that the vestiture of the anterior portion of the cheeks is black and that the posterior is white together with the two beards of equivalent value on the posterior tibiae is sufficient to distinguish males of this species from others known in New England at least. *Sarcophaga hæmorrhoidalis* Meigen and *S. dalmatina* Schiner while very distinct might possibly be confused with it by one not familiar with the group; the above characters will immediately differentiate them. Females of both these species

are separated from *S. bullata* by the character of the cheek vestiture and the notum of the first genital segment which is composed of one piece, as are the abdominal nota, and not divided into two lips. In addition, the female of *S. dalmatina* has one complete row of cilia behind the eyes instead of two.

In a discussion following the description of *Sarcophaga cooleyi* R. Parker (Can. Ent., vol. 46, pp. 417-423, Dec., 1914), known at present only from Montana, Wyoming and Utah, it was suggested that this species and *S. bullata* were close relatives. The genital segments of the females are very similar; those of *cooleyi* are interesting in that they show (at the sides) parts of a distinct fifth abdominal (sixth morphological) segment with its spiracles.

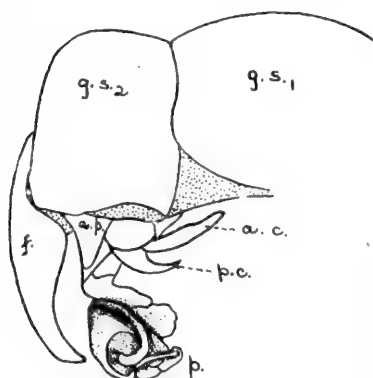


Fig. 19. *Sarcophaga bullata* n. sp., genital segments of male.

Among my material are several reared specimens of *S. bullata* which have light rather than dark palpi. The parts of the penis may be less compact and separated to a greater extent than figured in the drawing.

Felt (1913, see bibliography) described the larval and pupal stages from specimens reared on the head of a dead calf. From larviposition to adult was found to take from thirty-four to thirty-six days (Aug. 12 to Sept. 15 to 17). Dr. Felt very kindly sent

me six females from the specimens reared, which are unquestionably *S. bullata*. Metz (Station for Experimental Evolution, Cold Spring Harbor, Long Island), during the summer of 1914 reared this species on meat in several experiments. Undoubtedly it breeds in carrion. I also have records of its capture on cow dung, and at Springfield, Mass., captured it on human excrement. One specimen in the Massachusetts Agricultural College collection is labelled as caught flying around the "burrows of *Cryptorhynchus lapathi* (Linnæus)." A female received from C. H. Richardson was captured on cow dung. Specimens have also been reared from eggs.

(To be continued)

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE CONTROL OF ANTS IN DWELLINGS.—A NEW REMEDY.*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, DEPARTMENT
OF AGRICULTURE, OTTAWA.

A simple remedy for the control of ants in dwellings has long been a desideratum. The usual recommendations are: locate the nest outside and destroy the occupants by pouring into the entrance a quantity of bisulphide of carbon, kerosene emulsion, or even boiling water; trap the ants by placing on the shelves or other parts of the house frequented, sponges which have been soaked in sweetened water and which afterwards, with the ants therein collected, are dropped into boiling water; etc. Such other well-known recommendations as have been made from time to time need not be mentioned here.

During the summer of 1916, the common carpenter ant, *Camponotus pennsylvanicus*, was extremely abundant in a summer cottage in the Gatineau hills near Chelsea, Que., which my family occupied throughout the season. They were particularly numerous about the kitchen, frequenting especially a cross-beam near the chimney, close to which they evidently had established their headquarters. From this point they wandered throughout the kitchen and dining-room, getting into bread and cake boxes, etc., in fact, proving generally a decided nuisance. The problem of controlling ants in dwellings, therefore, became an immediate personal one, but fortunately a very simple one. Knowing the success which the United States Bureau of Entomology had had in controlling roaches with sodium fluoride, I obtained some of this powder and applied it during the evening of May 24, by

* Contribution from the Entomological Branch, Dept. of Agriculture, Ottawa.

means of a small puffer or dust gun. The powder was dusted into the openings between the beam and the roof, as also into other cracks or openings nearby. The following morning the ants were not nearly so noticeable, so I went over the ground again on the evening of May 25. Since this last date, practically no ants were seen in our cottage in the places where previous to the use of the sodium fluoride they were very abundant. The result of our first test of the use of this chemical as a remedy for ants in dwellings was so satisfactory that every opportunity of further experimenting with it was taken advantage of.

On May 27, I visited another summer cottage in the outside kitchen of which the common shed-builder ant, *Cremastogaster lineolata*, was present in countless numbers, causing much anxiety from its habit of crawling over tables, shelves, etc. In this dwelling the ants also frequented the beams supporting the roof. The sodium fluoride was dusted into the cracks between the beams and the roof and also on to shelves, etc., where the ants were present in numbers. An examination was made of this kitchen during the following evening and practically all the ants had disappeared, only a few here and there being observed. Only one application was made. The owner of this dwelling recently informed me that no further annoyance was caused by the ants during the remainder of the season.

In other nearby cottages, too, the same results were obtained, and from owners of summer dwellings on the Rideau Lakes and other places in the vicinity of Ottawa, to whom recommendations were made to use the sodium fluoride, the reports received have been similar and in all cases satisfactory. In one instance in the city of Ottawa the carpenter ant, *Camponotus pennsylvanicus*, was present in annoying numbers in the kitchen of an apartment house. The insects entered through a door which opened on to a balcony. In this instance the sodium fluoride was simply dusted on the floor near the door. After its use on two occasions only no further ants entered the apartment. In this latter instance the powder was simply placed in a shell vial and dusted on to the floor through a cheese-cloth covering which had been tied over the opening.

THE SUSCEPTIBILITY OF THE EGGS OF *APHIS POMI* AND *APHIS AVENÆ* TO HYDROCYANIC ACID GAS FORMATION.

BY WILLIAM A. ROSS, DOMINION ENTOMOLOGICAL LABORATORY,
VINELAND STATION, ONTARIO.

It is of economic interest to note that the fumigation of young apple trees with hydrocyanic acid gas just before or shortly after the buds commence to swell not only controls the San José scale, but it also destroys the eggs of aphides.

In the spring of 1914, we procured from a local nursery seven apple trees well stocked with the eggs of *Aphis pomi* and *Aphis avenæ*. Three of the trees were fumigated for forty-five minutes with hydrocyanic acid gas (1 oz. KCN to 100 cubic feet, 1:1:3 formula), and the others were used as checks. None of the eggs on the fumigated nursery stock hatched, whereas large numbers hatched on the check trees.

This spring the foregoing experiment was duplicated, and the same highly satisfactory results were obtained—100 per cent of the aphid eggs were destroyed.

In the 1914 experiment the nursery stock was fumigated eight days, and in the 1916 experiment six days before the eggs on the check trees commenced to hatch.

A CHANGE OF SYNONYMY IN *XYLOMIGES* (LEPID.).

BY F. H. WOLLEY DOD.

The species described by Smith as *Xylomiges pallidior* is identical with *simplex* Walk. Harvey's *crucialis*, hitherto misidentified as *simplex*, is distinct. Even after seeing Smith's type and possessing specimens of both forms, it was some years before I was at all sure that the species really existed, as the difference appeared to be merely varietal. But, as time went on and I saw and acquired more material, their distinctness became apparent. Having become satisfied as to the existence of two species, judged by superficial characters alone, I got Mr. Tams to make several mounts of the genitalia of each, including Vancouver Island specimens of both forms. These were found to differ in such a way as to make their separation quite easy. Being at present separated from my specimens and mounts by several thousand miles, I am unable to state concisely just what these differences are, but hope to make it clear some day.

November, 1916.

Smith published a photograph of his type in the Canadian Entomologist, leaving the identity of his species beyond doubt. I also possessed a specimen "Xd. type" with Walker's *simplex*. But as that comparison had been made at a time when I had failed to recognize two species, I was unable to place any reliance on the comparison. I was, however, quite satisfied as to the distinctness of *crucialis* from *pallidior*. Hampson published a figure of *pallidior*, made from another, of the type, sent to him by Smith, which is quite recognizable. His woodcut of *simplex* is not so good, but my notes on Walker's type were such as to lead me to suspect strongly that I had made a mistake and that Smith also had fallen into his oft-repeated error, in that, whilst recognizing two very closely allied species, instead of seeking a re-identification of *simplex*, he had chosen to assume its correctness, and created a synonym. I accordingly sent Sir George Hampson a few specimens of each, stating my suspicions, carefully pointing out the distinctive characters, and requesting him to re-examine Walker's type. His diagnosis was in accordance with my suspicions, and I have since visited the British Museum and corroborated his evidence, which results in the synonymy here cited. I regret being unable, at present, to publish a close comparison of the two species, for reasons given above, but feel safe in emphasizing the following points: *Crucialis* is slightly longer-winged than *simplex*, the discoidal spots are a trifle smaller, and the subterminal line or series of blackish streaks is arranged so as to form two oblique triangular shades. In *simplex* they form a more regular and even series, about parallel with the termen. The two species occur together and are not rare on Vancouver Island. Whilst *crucialis* has usually the clearest white ground colour of the two, both have a dark, almost suffused, grey variation. I have been misled into mistaking the extreme dark variations of either species for one form, the corresponding light variations for the other, and must warn others against falling into this error. It must be admitted that the two species are not easily distinguished unless well known.

The synonymy stands as follows:—

Xylomiges simplex Walk.

" *pallidior* Smith.

Xylomiges crucialis Harr.

" *simplex* Smith et al., nec Walk.

NOTES ON THE PSAMMOCHARIDÆ DESCRIBED
BY PROVANCHER, WITH DESCRIPTION
OF A NEW SPECIES.

BY S. A. ROHWER.

Bureau of Entomology, Washington, D. C.

The following notes on the types of the species of *Psammocharidæ*, described by Abbé Provancher, were made in June, 1915, and presented with the hope that they will enable Hymenopterists to understand these species better. The new species here described had previously been considered to be *minima* Provancher, but is easily distinguished from that species as the following notes will show.

No types were definitely designated by Provancher, and in the collection there is no indication as to which specimen is type. In this paper the word "type," etc., is used in the sense of "electro-type."

Ceropales (*superba* Provancher)—**robinsoni** Cresson.

Type in Harrington collection; paratype bearing yellow label "766" Dernière Provancher Collection Public Museum, Quebec.

The synonymy indicated by Fox is no doubt correct.

Ceropales minima Provancher.

Type a male with blue label "124" (script) and yellow label "1420" (printed) in Dernière Provancher Collection, Public Museum, Quebec.

This is very probably a dark form of *fraterna* Smith, although no specimens with as few yellow marks on the abdomen are available. In the type the dorsal aspect of the propodeum is granular with a feeble, short, median sulcus, the posterior face is transversely aciculato-granular; the third cubital on the cubitus is twice as long as the second, and on the radius but little shorter than the second; the head is granular and has no median sulcus on the front.

Ceropales foxii, new species.

In Fox's synopsis of North America *Ceropales* (Trans. Amer. Ent. Soc., vol. 19, 1892) this species will fall near *femoralis* Cresson, November, 1916.

but may be distinguished from it by a number of characters as the following description will show.

Male.—Length 5 mm. Clypeus very gently, arcuately emarginate; front granular and with a few scattered distinct punctures, and a shallow elongate fovea at about the middle; vertex and posterior orbits shining almost impunctured; postocellar line distinctly shorter than the ocellocular line; antennæ subequal to the length of the head and thorax, the third and fourth joints subequal; thorax shining with a few sparse punctures; the dorsal plate of mesepisternum with larger punctures than the lower; second pleural suture foveolate; propodeum granular with a distinct sulcus, the base of which is foveolate; nervulus slightly antefurcal; first intercubitus strongly curved towards the base; second and third cubital cells subequal on the radius, but on the cubitus the third is distinctly longer; longer calcarium of hind tibiæ three-fourths the length of the hind basitarsus; abdomen shining. Black; clypeus except a basal median spot, inner orbits to near top of eye, spot between antennæ, scape beneath, posterior orbits except medially, lateral anterior dorsal angles and posterior margin of pronotum, spot on metanotum, and lateral, apical spots on first three tergites yellow or yellowish-white; flagellum piceous; legs beyond bases of femora rufo-piceous; wings hyaline, venation yellowish, costa, subcosta and base of stigma brown; posterior face of propodeum and the hind coxæ with dense silvery pile, the rest of the body without dense pile.

Falls Church, Va. Described from one male collected July 22, by S. A. Rohwer and named in honour of W. J. Fox, the reviser of the North American species of this genus.

Type.—Cat. No. 20118, U. S. N. M.

***Agieniella atrata* (Provancher).**

Location of type not known. Allotype (♂) has blue label "125" (script) and yellow label "1417" (printing), and is in Dernière Provancher Collection, Public Museum, Quebec.

The allotype is the same as the species treated by Banks (Jn. N. Y. Ent. Soc., vol. 19, 1912 (1911) p. 234) under this name.

Ageniella perfecta (Provancher).

Type male bearing yellow label "783" in the Dernière Provancher Collection, Public Museum, Quebec.

The type runs to *perfecta* in Banks' table (Jn. N. Y. Ent. Soc., vol. 19, 1912 (1911) p. 234) but differs from a specimen (in Banks' collection) determined as that species in the shape of the third cubital, which is larger and has the outer margin oblique (not curved) and the second recurrent is a little beyond middle.

Ageniella rufigastra (Provancher).

Type female bearing blue label "122" (script) and yellow label "1419" (printing) in Dernière Provancher Collection, Public Museum, Quebec.

This species has usually been considered a synonym of *congrua* Cresson, but the type differs from a homotype of *congrua* made by Banks (in coll. Banks) in the blackish hind legs and in the decidedly postfurcal nervulus.

Episyron griseus (Provancher).

Provancher's type is a male, not female, and is in the Dernière Provancher Collection in the Public Museum of Quebec, bearing a yellow label "1011" on pin.

This species is related to *biguttatus* etc., but may be distinguished by the angulate posterior margin of pronotum and absence of markings on the abdomen. The abdominal markings are, however, not constant, and specimens from Canada (Baker collection) in the National Museum, which have the posterior margin of the pronotum angulate but have two lateral spots on the third tergite, have been placed under Provancher's species.

Pompiloides apicatus (Provancher).

Type female bearing yellow label "769" in Dernière Provancher Collection, Public Museum, Quebec.

The following notes may aid in the determination of this species. Propodeum shining with a distinct median furrow; second and following tergites with appressed pile; nervellus postfurcal; first intercubitus strongly curved; third intercubitus

distinctly angulate; eyes nearly parallel the antennocular line longer than the interantennal line; antennæ rather short and stout.

Pompiloides (*castaneus* Provancher)—**argenteus** (Cresson).

Type male bearing yellow label "774" and name label "*argenteus* Cress." Dernière Provancher Collection, Public Museum, Quebec. Provancher's manuscript list proves that this is type of *castaneus*.

Argenteus (Cresson) agrees with all of the notes made on *castaneus*, and there seems to be but little doubt that the synonymy indicated by Provancher is correct.

Batazonus coquilletti (Provancher).

Type male Cat. No. 1980, U. S. Nat. Mus.

This is probably a synonym of *navus* Cresson.

DESCRIPTION OF A NEW SESIID.

BY WILLIAM BEUTENMULLER, NEW YORK.

Gaëa arizonensis, sp. nov.

Female.—Fore wings opaque, golden orange red, dusted with fuscous in the intervenular parts. All the veins, rather heavily marked with fuscous. Discal mark fuscous, edged with orange red. Hind wings transparent, veins fuscous, and the outer margins narrowly edged with orange red. Fringes fuscous. Under side of fore wings with the intervenular parts considerably brighter, orange red, as also the transverse discal mark, which is wholly orange red. Hind wings similar to the above, but with the narrow, orange red margins brighter. Head black; palpi yellow. Antennæ orange red, fuscous terminally and decidedly clavate. Abdomen brown-black with a broad, yellow band on the posterior edge of each segment, except the fourth, the last three bands broader than the three basal ones. Anal tuft lemon yellow. Under side of abdomen, with all the bands much broader and the fourth also banded. Posterior legs yellow, joints black, femora black (remaining legs wanting). Expanse 25 mm.

Habitat.—Pinal Mts., Arizona.

Described from a single female. Type: collection Dr. William

Barnes.

November, 1916.





- 1.—Type of *Tortrix oleraceana* sp. nov., natural size.
- 2.—Type of *T. oleraceana*, enlarged four times.
- 3.—Leaf of cabbage showing edges rolled by the larva of *T. oleraceana*.

A NEW SPECIES OF TORTRIX OF ECONOMIC
IMPORTANCE, FROM NEWFOUNDLAND
(LEPIDOPTERA: TORTRICIDÆ).*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, IN CHARGE
OF FIELD CROP INSECT INVESTIGATIONS, DEPARTMENT
OF AGRICULTURE, OTTAWA.

Towards the end of July, 1915, Mr. Albert J. Boyle, the Acting Secretary of the Newfoundland Agricultural Board, St. John's, Newfoundland, sent to the Dominion Entomologist leaves of cabbages which were infested by a small tortricid larva. The caterpillars pupated in transit, and moths emerged at Ottawa as follows: three on August 9 and one on August 17. The caterpillars, we were informed, were present in very destructive numbers on some farms near St. John's, Nfd., in fact on one farm, according to Mr. Boyle who personally investigated the outbreak, the whole of the first and much of the second plantings of cabbages were destroyed by the larvæ. The larva curls the leaf like other tortricids; this habit is shown in the figure herewith, the photograph having been taken from material received from St. John's.

Mr. Boyle informed us that oftentimes in spring cabbage plants are imported into Newfoundland from Ireland, and for this reason we thought that the moth might be the European species, *Tortrix virgaureana* Tr. Two specimens were, therefore, forwarded to Dr. Guy A. K. Marshall, Director of the Imperial Bureau of Entomology, who submitted them to Mr. Durrant, of the British Museum. Mr. Durrant examined the specimens but could not associate them definitely with *virgaureana*. Dr. Marshall reported that the black spots in the Newfoundland insect are much better defined than in any of the British species and are rather more numerous. Mr. August Busck, of the U. S. National Museum, also kindly examined a specimen of the Newfoundland moth and reported that it is undoubtedly closely allied

* Contribution from the Entomological Branch, Department of Agriculture, Ottawa.
November, 1916.

to *Tortrix wahlbomiana* L. var. *virgaureana* Tr., but that it did not match any of the more than fifty bred European specimens in the Museum. He also added, "nor is it any of our described North American species."

In view of the economic importance of the insect it seems desirable to give it a definite name, and, therefore, I propose the following:

***Tortrix oleracea*, sp. nov.**

Labial palpi gray outside irrorated with cream, pale cream inside with darker tips. Antennæ; head, body and fore-wings neutral gray, thickly irrorated with cream. The fore-wings bear conspicuous, blackish, irregular spots. In the inner half of the wing these spots are arranged to form an imperfect letter W; they occur as follows: a double transverse anterior series, more or less joined together and extending from the costa to a distance of about three-quarters of the width of the wing; from the posterior end of the anterior series the spots extend obliquely forward to within one-quarter the width of the wing from the costa, and then obliquely backward, joining, a little below the centre of the wing, the inside spots of a double median series which form the distal arm of the W and extend rather closer to the inner margin than the anterior series. The spots in the median series are not so frequent. In the space above the internal angle of the W there are also a few blackish spots. In the distal half of the wing a number of blackish spots are present, extending from the costal to the dorsal area; these latter spots are not arranged after any pattern but occur chiefly toward the margins; near the outer margin the spots are distinctly larger and form a submarginal row. Outer margin blackish with a cream edge. Cilia concolorous with wing. On the costa near the outer row of the transverse anterior spots are two conspicuous cream-coloured areas between which is a blackish blotch; two other distinct cream-coloured costal areas are also present in the distal half of wing, the inner one of which adjoins the outer arm of the W. Between these two latter cream-coloured spots there is a blackish, V-shaped costal spot. In addition to these pale costal areas, there are also a few other cream-

coloured spots, not so large or distinct, chiefly in the apical area of the wing.

Hind wings wholly neutral gray, irrorated with cream. Body beneath pale metallic cream. Legs gray, outside irrorated with cream and crossed by bands of the same colour; pale cream inside.

Alar expanse 19 mm.

Type deposited in collection of the Entomological Branch, Department of Agriculture, Ottawa.

Variations.—During the present year (1916) the insect has again been destructive in Newfoundland, and Mr. Boyle has forwarded to us specimens of the larvæ from which additional moths have been reared. The description of the type given above answers closely to all of the specimens reared (8) with the exception of two specimens which differ in having each fore-wing crossed with two irregular whitish bands, in addition to which there is a basal and an apical patch of the same colour. These specimens are labelled metatypes A and B respectively in the collection of the Entomological Branch. The bands and patches on the fore-wings of metatype A are conspicuously whitish, those on B being more of a sordid white.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD.

(Continued from Page 232.)

Hadena sp. A single specimen without date, broken and verdigrised, standing as *didonea* Sm., I believe to be of an undescribed species closely allied to *indirecta* Grt., and use a manuscript name for it in my private notes. A specimen of it stood wrongly under *didonea* in Smith's own collection. I have seen some half dozen specimens from widely separate localities.

Hadena egens Walk. (syn. *transfrons* Newm.).

Hadena claudens Walk. Some of the specimens stood as *albertina* Hamps., possibly on my authority. Dr. McDunnough
November, 1916.

is of the opinion that *albertina* is not distinct from *claudens*, which is very likely correct.

Hadena misclioides Gn. *Macerata* Sm. under which name the species stood, is the same thing. So also is *miscellus*.

Hadena fractilinea Grt.

Polia contacta Walk. (syn. *pulverulenta* Sm.). Two specimens, standing as *extincta*, doubtless on Smith's authority. It may possibly be correct, but *extincta* is at present unidentified in collections.

Polia acutissima Grt. (syn. *medialis* Grt.). Heath used often to distribute this species as *confragosa* Morr. That is very likely correct, though no one is able to state so positively at present.

Dryobota illocata Walk.

Hyppa xylinoides Gn.

Trachea delicata Grt. One specimen.

Euplexia lucipara Linn. Mr. Tams finds that the male genitalia of all the North American *lucipara* he has so far examined differ from those of British specimens.

Actinotia ramosula Gn. One female, July 30th, 1910.

Dipterygia scabriuscula Linn.

Pyrophila pyramidoides Gn.

Helotropha reniformis Grt. A very fine and variable series. Some stood under *plutonia* Grt.

Laphygma frugiperda S & A. A good series. A single specimen also did duty for *Euxoa acornis*, a species not in the collection.

Homohadena stabilis Sm.

Homohadena infixa Walk. This stood as *fifia* Dyer, which is possibly correct.

Homohadena badistriga Grt.

Oncocnemis atrifasciata Morr. One specimen.

Oncocnemis viriditincta Sm. One specimen.

Oncocnemis poliochroa Hamps.

Oncocnemis riparia Morr. One specimen, amongst *cibalis*.

Oncocnemis cibalis Grt.

Adita chionanthi S. & A.

Rhynchagrotis gilvipennis Grt.

Rhynchagrotis rufipectus Morr.

Rhynchagrotis placida Grt. The species stood also as *minimalis* and *anchocelioides*.

Rhynchagrotis alternata Grt.

Adelphagrotis prasina Fabr.

Platagrotis pressa Grt. Other specimens of it stood as *condita* Gn.

Euretagrotis sigmoides Gn.

Euretagrotis perattenta Grt. The specimens were of the dull, poorly marked form named *innatenta* by Smith.

Euretagrotis attenta Grt.

Pachnobia littoralis Pack.

Pachnobia salicarum Walk.

Agrotis ypsilon Rott.

Peridroma occulta Linn. A series under the correct name, and a rubbed series elsewhere as *Polia pulverulenta* Sm.

Peridroma astricta Morr.

Peridroma margaritosa Hbn.

Noctua baja Linn.

Noctua normaniana Grt.

Noctua bicarnea Gn. Several specimens, mostly mixed with *treatei*, and one with *collaris*. Manitoba specimens appear to be rather hard to separate from *treatei*. I have never seen it from west of Manitoba.

Noctua treatei Grt. Two specimens.

Noctua substrigata Sm. One specimen, July 18th, 1911.

Noctua c-nigrum Linn.

Noctua cynica Sm. A series stood under *cynica*, *rubifera* and *rosaria*. In describing *cynica* Smith Stated that it was separable from *rubifera* only by male genitalia. So far I have found nothing to match what he figures as genitalia of *rubifera*.

Noctua rosaria. Two males. Their resemblance to *cynica* was closer than that of any I had previously seen. I have referred this species to *rubi* View, but Mr. Tams finds that the genitalia differ.

Noctua fennica Tausch.

Noctua plecta Linn.

Noctua collaris G. & R.

Noctua haruspica Grt. The largest specimen stood under this name, and smaller ones under *inopinatus*. *Inopinatus* is scarcely a recognizable variety.

Noctua clandestina Harr. A few worn *haruspica* were mixed with this series. One very badly worn *clandestina* stood by itself as *havila*. Elsewhere, five worn specimens, and one of *rufipectus* stood as *Amphipyra tragopoginis*, which was not in the collection.

Noctua atricincta Sm.

Chorizagrotis auxiliaris Grt., with its varieties *introferens* Grt., and *agrestis* Grt. Specimens also stood under *soror* Sm. The latter name does not refer to a distinct species, but I am unable at present to designate the exact variety.

Chorizagrotis balinitis Grt. Two specimens. A few forms of *auxiliaris* stood associated with them.

Chorizagrotis thanatologia Dyar. There were two specimens which I consider referable to this species. One fine male was near var. *sordida* Smith, and a female was var. *perfida* Dod. Both the specimens stood under *tessellata*.

Rhizagrotis flavicollis Sm.

Rhizagrotis perolivalis Sm. Other specimens of it stood as *plagigera* Morr.

Feltia ducens Walk., and the small, pale var. *hudsonii* Sm.

Feltia herilis Grt.

Feltia venerabilis Walk.

Feltia volubilis Harv.

Porosagrotis mimallonis Grt.

Euxoa segregata Sm. Four specimens, a ♂ and 3 ♀♀. A female bore date Sept. 29th, 1903. Another ♀ had red ink label No. 177. Very rare in Canada.

Euxoa niveilinea Grt. Two males, standing as *quadridentata*, I decided were this species.

Euxoa ridingsiana Grt. (syn. *maimes* Sm.).

Euxoa dargo Strk. One specimen, as *rumatana* Sm., which is an exact synonym.

Euxoa velleripennis Grt. And other specimens of it as *perpolita* Morr.

Euxoa catenula Grt. (syn. *contagionis* Sm.) Two specimens, of which one female only was dated, Sept. 24th, 1910. It was a surprise to see this species from Manitoba. It is extremely rare in Canada.

Euxoa scandens Riley. Standing as *Porosagrotis vetusta* Walk., which was not in the collection.

Euxoa deterra Walk.

Euxoa poncha Smith. Three males, fortunately all dated, Sept. 17th, 1904; Sept. 13th, 1910, and Sept. 20th, 1911. Heath had presented me with a fourth specimen about a year previously. It had stood in his collection as *citricolor* on Smith's authority. That determination was obviously wrong, though it resembles it in colour. I submitted a specimen to Messrs. Barnes and McDunnough, who decided that it was almost certainly *poncha*, one of the last species described by Smith, from Poncha Springs, and other localities in Colorado. It is allied to *medialis* and *cænis*, but very closely to *citricolor*.

Euxoa messoria Harr. A series correctly, and others as *fuscigera* Grt., and *septentrionalis* Walk. Two specimens of *pindar* Smith stood under *abar* Strk. I am under the impression that *pindar* is a variation of *messoria*. *Abar* Strk. is *divergens* Walk. I have seen Strecker's type.

Euxoa pleuritica Grt.

Euxoa incallida Sm. Some specimens stood separated as *quinquelinea* Sm.

Euxoa rena Sm. Standing as *dissona* Moschl.

Euxoa declarata Walk. (= *insulsa* Sm., nec Walk.). This species was very badly mixed. A confusion of it with *albipennis* is always excusable, as they are really very close allies. A worn series did duty for *intrita* Morr., and an aggregation referred to *titubatis* consisted principally of worn *declarata*.

Euxoa albipennis Grt. A long series stood under this name and *verticalis*. The latter is a form about intermediate between

albipennis and *declarata*, and its exact status cannot at present be determined, as a long series appears to intergrade with both, with a distinct balance in favour of *declarata*. The same may be said of *spectanda* Smith. The most interesting evidence deduced from Heath's material in this group, showed the presumed identity of *indensa* Sm. This was described from Cartwright shortly before Smith's death. Several years previously I had pointed out to Smith that Manitoba specimens associated with *albipennis* in his collection were of the form he had described from a unique as *malis*. But the type of *malis* happens to be a small and rather stunted specimen, and he apparently ignored the suggestion, as he never mentioned *malis* in his description of *indensa*. The *indensa* of the Heath collection was *malis* Sm., and the description fits. I have been familiar with the form for many years, and believe it to be a pale grey variation of *albipennis*.

Euxoa tessellata Harr. A series under this name, and another under *focinus* Sm., which is the same species.

Euxoa basalis Grt.

Euxoa ochrogaster Gn. Four small specimens of this species stood separated as *acutifrons* Sm., presumably on Smith's authority. I believe *acutifrons* to be a reddish form of *tessellata*, approaching var. *nordica* Sm. The resemblance of these small *ochrogaster* to reddish specimens of *nordica* was very striking, and Smith's error in this case was less unjustifiable than was so often the case with his determinations.

Euxoa idahoensis Grt. Two specimens, as *furterus* Sm. which is very likely the same species. A specimen of apparent *ochrogaster* stood with them, and indeed resembled them so remarkably that the misassociation was quite excusable.

Euxoa obeliscoides Gn. Smith re-described from Manitoba specimens as *infusa*. Specimens from this region almost entirely lack the red shades of typical *obeliscoides*, though Smith's "species" was not based on the colour difference.

Euxoa divergens Walk.

Euxoa redimicula Morr.

Euxoa tristicula Morr., and the variety without the black markings, *remota* Smith, which he re-described as *nesilens*.

COLLECTING NOTES AND RANDOM OBSERVATIONS
ON THE MAINE COLEOPTERA.

BY C. A. FROST, FRAMINGHAM, MASS.

Cicindela purpurea limbalis Klug. Two female specimens of this variety, taken at Wales, June 15, 1909, are very much like the single specimen from Mt. Desert Island that was given me by Mr. E. D. Harris.

Cicindela formosa generosa Dej. A single specimen of this species was seen at the roadside in Monmouth, June, 1912, and is the most eastern record that has come to my notice. I once took a few at Ogunquit Beach, September 17, 1903. They were not along the beach with the swarms of *hirticollis*, but back on the high sand dunes and on the slope toward the meadow behind it.

Omophron americanum Dej. My first specimen of this common but interesting species was found when in bathing in Lake Cochnewagin at Monmouth, June 20, 1907. It was driven out while walking on a small sand pit that extends out along a swampy meadow, and further investigations by treading about and throwing water drove them from their burrows by dozens. They also occur along the sandy margins of small brooks where the vegetation is sparse and, like *Elaphrus*, often appear before the eyes as if they had sprung out of the ground or had magically evolved from the bare sand.

Elaphrus clairvillei Kirby. I secured a good series of this fine species at Wales, July 9, 1913, along the edges of a meadow through which runs a small brook. They were found at the line where the growth of alders and other small trees met the rushes of the wet, and in some places very soft, meadow bottom. The first specimen was found under a bit of bark in a small area of bare mud under a large swamp maple on July 6, but I was not able to thoroughly explore the swamp and took only six specimens. A few days later I started out bright and early, armed with a pair of rubber boots, and worked along the edges of the bushes for a quarter of a mile or more. They could be driven into sight and easily captured by treading carefully about a small area of from November, 1916.

six to ten feet in diameter. Rarely more than one specimen was taken in a spot, and the eyes had to be constantly fixed on the ground to get any. An entire day was spent at this back-breaking collecting, and when sunset came I felt very much as I used to feel after a day of potato digging.

Elaphrus olivaceus Lec. After returning home and critically examining the catch of *clairvillei*, I was delighted to find two specimens that I thought were *laevigatus*, but comparison with the single specimen in the LeConte collection at Cambridge showed them to be typical *olivaceus*, which I had supposed was a mountain species. These specimens were taken out in the open meadow at the edge of the brook on bare and soft mud. This sluggish, winding, meadow stream which is barely two feet wide in places and in others scarcely traceable, can be but a few hundred feet above sea level, and is hidden between hills of more than a hundred feet rise. On the west, a mile away, is Sabattus Mountain, the highest elevation for miles around. The vegetation of the meadow is the common, coarse, broad-leaved grass of the low lands in Maine, and along the edge *Alnus incana* which runs up in places to meet the juniper of the bare and rocky pasture land. Within the last few years the larger growth of the hillsides has been cut off.

Elaphrus cicatricosus Lec. On June 25, 1912, and July 16, 1914, I visited the woodland swamp on the shore of Lake Cochewewagin at Monmouth where I had found this species in 1910. It is rather remarkable that three specimens were taken on each of the three years, one specimen in one spot and two in the other, and either spot can be covered with a wash tub. One additional specimen was taken after thoroughly "treading" over the thousand or so square feet of swamp in 1914. No specimens could be found in the denser growth where no sun entered and no grass grew.

Blethisa quadricollis Hald. My only specimen of this species was taken at Wales, June 23, 1912. I had dammed up a tiny rivulet to drive out small species of beetles, and the rising water chased into view this fine Carabid.

Badister pulchellus Lec. While hunting for *Elaphrus* at Wales, as previously noted, five specimens of this showy little beetle

were picked up on the ground in the meadow. Comparison with the species of this genus in the LeConte collection, showed that all but one of my species were marked almost exactly like the specimens labelled *bipustulatus* Fab., but in every specimen the hind angles of the prothorax were depressed in a manner similar to that of the types of *pulchellus*. My specimens show that the extent of the black markings is variable and indicate that a larger number of specimens will give a complete series of colour intergrades. We shall then have but comparative extent and depth of the depressions of the hind angles of the prothorax for the specific difference (Bull. Brooklyn Ent. Soc. vol. V, p. 7) I have not examined the two species for other differences, but the character above given is very slight in the specimens seen.

Necrophorus vespilloides Hbst. Two specimens of this species were taken on a dead woodchuck in the deep woods at Wales, June 15, 1909, and another specimen from the same locality bears the date of July 10, 1913.

Listrotorhynchus cingulatus Grav. Some time was spent at Monmouth watching this species to find the reason for their immediate appearance on fresh cow dung. I soon found that they were stalking the green flies that infested the manure in numbers. Several of the beetles were observed with flies in their jaws, but the exact manner in which they were seized was not seen. The beetles evidently came upon them around the edges of the pile or cornered them in folds and pockets of the mass. They have also been seen feeding on adult *Aphodius fimetarius*.

Phymaphora pulchella Newm. Four specimens were found at Monmouth, June 27, 1912, beneath the ragged bark of a dead basswood (linden) tree. In identifying this rare catch it was noted that figure 199 on page 537 of Blatchley's Coleoptera of Indiana is a fair representation of *Mycetina perpulchra* Newm. and not of *P. pulchella* Newm. as stated in the text.

Cryptorhopalum hæmorrhoidale Lec. This species has been taken rarely on Spiræa flowers in Maine. Three were taken somewhere within the limits of the town of Turner on July 14, 1914, by the labour-saving method of sticking the net out of the automobile as we rode along the narrow shrub-fringed road.

Ips confluentus Say. The necessity of using care in passing by supposedly familiar insects was well illustrated when I recently examined a bottle of alcoholic specimens taken at South Paris, July 10, 1914, and found my first specimen of this species. I had carelessly scraped it out of the pitch on the end of a log in the mill yard for *I. sanguinolentus*, but with a vague feeling that there was something unfamiliar about it. I wonder how many rarities I have discarded!

Georyssus pusillus Lec. Three specimens were taken on a sand bar in the Little Androscoggin River at South Paris, June 17, 1912.

Limnichus punctatus Lec. On June 15, 1907, while I was sitting by a spring in Wales trying to reduce my temperature and satisfy my thirst by keeping at the saturation point, I noticed many of these small insects very slowly moving about on the sandy mud along the tiny stream that ran from the spring. I captured all in sight and started out more by throwing water on the bare places.

Tharops ruficornis Say. On June 23, 1910, two were taken by beating at Monmouth, and on the 25th I found a few more resting on the ends of beech sticks in piles of cordwood in a forest clearing at Wales.

Alaus myops Fab. This species has been taken a number of times on logs at Paris and Monmouth, while at the latter place it was once found feeding on the sap that oozed from a red oak stump. Several years ago I took a couple of *Alaus* larvæ under the bark of a white pine stump at Monmouth about June 25. The larger one was two and one-half inches long and apparently full grown. They were put into a box with twenty or thirty large ant larvæ and half a dozen *Elater* larvæ, and at the end of three days only the large larva remained. A second lot of larvæ disappeared in the next two days, and the surviving *Alaus* was brought to Framingham, Mass. At odd times during the fall more larvæ were put in the box which was a tin one about ten inches high and four by eight inches in the other dimensions; it was more than half full of dirt, rotten wood, and mould. On October 7th the larva was

found to be covered with small yellowish-white mites, and they were carefully scraped off with a sharp knife. As a reward I received a bite on the finger that penetrated the skin deep enough to bring the blood. On August 25, more than a year after the capture, I found in the box a very lively *Alaus myops* that measured 39 millimeters. From the same box there appeared *Coscinoptera dominicana* and *Pogonocherus mixtus*, two fortunate individuals that had escaped the maw of the savage *Alaus*. It seems to me that the larva of this insect is generally carnivorous instead of lignivorous as has been often stated. The flattened head and prominent mandibles are well fitted for searching out and seizing larvæ beneath the bark of dead and dying trees, or stumps from which the bark has become loosened.

Melanotus leonardi Lec. A number of specimens of this were taken at Paris, June 15, 1910, on raspberry bushes that fringed the bare, ledgy summit of a hill.

Corymbites vernalis Hentz. Five or six specimens of this were taken at Wales, June 16, 1907, on the flowers of the black cherry (*Prunus serotina*) and on June 12, 1909, a few more were taken flying about a clump of *Prunus virginiana* near the same locality.

Corymbites fallax Say. The only specimens I have ever seen were the two that were beaten from small paper birch trees near the summit of a hill at Paris, June 15, 1910.

Hypnoidus melsheimeri Horn, a variety of *pectoralis* Say, *exiguus* Rand., and *striatulus* Lec. (?) were all taken on July 9, 1914, at the old fording place on the Little Androscoggin River at South Paris. They were discovered by turning over the stones that were half imbedded in the sandy soil and pulling up the bunches of grass that grew among them. I do not think they were beneath the stones but around the edges, from whence they were dislodged into the cavity. All the specimens were found in one spot a few feet in diameter and I could not find them anywhere else on the beach, even in spots that appeared exactly the same.

The noon sun had poured down its rays upon this spot and the high banks and wooded shores had guarded it from every

breeze until the stones were uncomfortably hot, but it was evidently a place of interest to these pretty little elaters. They exhibited surprising activity coupled with the ability to disappear as if by magic, even snapping themselves out of sight from the wetted finger before it could be placed over the alcohol bottle, while attempts at picking them up with the fingers or tweezers resulted mainly in pinches of sand. By drenching the spot with water they become less lively but also less conspicuous. A single specimen of the variety of *pectoralis* was later swept from some weeds. In 1913 I took *exiguus* in numbers a few feet from this spot, under the same circumstances.

Limonium aurifer Lec. This elegant little creature was taken once by beating maple sprouts in a forest clearing in Wales, June 24, 1910.

Drapetes geminatus Say. One specimen was swept from *Alnus incana* at Wales, July 9, 1913, and two more were taken at Monmouth, July 14, and 17, 1914, in a cut over woodland full of slash and raspberry bushes. One of these two was swept from raspberry bushes and the other was crawling on a dead maple stub.

Chrysobothris blanchardi Horn. At Paris (July 12 to 19, 1913) I took a number of this species on pine logs in the mill yard and on the trunks of the white pines growing near the lumber piles. I thought they were *trinervia* until my returning home, when I found they were the first series of *blanchardi* I had ever taken. One specimen was taken in the same place on July 16, 1914.

Agrilus politus Say. Several specimens of a dark purple-cupreous were taken on *Corylus* leaves at Paris on July 9, 1914. These are of the same colour variety as specimens taken on *Corylus* in Mass., June 22, 1913, and June 21, 1914.

Agrilus arcuatus Say. A single specimen of this was taken at the same time and place as the preceding species. This variety was called *coryli* by Dr. Horn in his "Species of *Agrilus* of Boreal America" page 297, and there seems to have been no description of it other than these few words: "Var. *coryli* Horn.—Colour uniformly bright brassy." The colour varies from a bright brassy-cupreous to a dark purple-cupreous, and so closely do these colour forms resemble those of *politus* that a careful examination

of the sculpture, thorax, or claws is necessary to separate them. Both species were taken on the same patch of *Corylus* at Sherborn, Mass., and for some time remained mixed in my boxes as *arcuatus*. It would seem from this and from other facts at hand that the food plant has much to do with the variations in colour that are exhibited by this interesting genus.

Collops tricolor Say. Several specimens were taken at Paris, June 14, 1910, running about on the sun-scorched ledge at the summit of a hill of perhaps a thousand feet elevation.

Ptinus bicinctus Sturm. A number of dead specimens of this species were taken by sifting the debris from the grain bin and the barrels and boxes in the corn house at Wales, about July 1, 1905. I also noticed that many of the numerous pellets of rat dung were perforated with a neat hole in the side and contained a whitish, hairy larva. A few specimens were bred, but most of the material was sent to Prof. H. C. Fall who determined the species for me.

Ptilinus ruficornis Say, has been taken quite commonly at Monmouth, June 21 to 25 on several years, and at Wales it was found boring into beech wood June 25, 1910. In my series there are three males and twelve females, which shows the relative abundance of the sexes.

Odontosphindus denticollis Lec. Three were taken on the top of an oak stump in a species of flattened fungus, June 27, 1912.

Trox scaber Linn. At Monmouth on November 28, 1907, I found a large number of adults under an old blanket which had evidently been lying for some years beside a cart road.

Serica tristis Lec. This species has been very common on *Alnus incana*, at Monmouth June 21, 1910, at Wales June 26, 1909, at Paris June 19, 1912, and was taken at Fabyans, N. H. July 4, 1914. It has been seen eating the petals of blackberry flowers.

Aphonus tridentata Say. I have always been puzzled to account for finding dead specimens of this species on well-travelled roadsides, in beaten paths, and in sand pits. The specimens are generally spread out with no indications that they have been killed by birds or insects, and many times in perfect condition.

I have found but one live specimen. The earliest date is June 13, at Paris, and the latest August 2, at Wales.

Euphoria fulgida Fab. Two specimens were taken at sap on a red oak stump at Monmouth June 29, 1912. One of these was decorated with a number of spots resembling whitewash on the disk of the elytra, and a single spot on each side near the margin. This is the only one I have ever taken with white markings. I once saw a number of these beautiful insects flying about me while surveying. They were attracted to the brass mountings of the level on which the sun was shining. Near me was a corn field in which the farmer had hung pieces of tin to scare off the crows, and perhaps these shining, swaying bits of metal had first attracted them to the locality.

Physocnemum brevilineum Say. About the 16th of July, 1913, I was pleased to discover that these graceful little creatures were visiting the elms in the village of South Paris, and from noon until nearly 5 p.m., while the sun was shining, I replenished my meagre supply. They did not favour trees under two feet in diameter, and were found low down on the trunks running in and out of the crevices and folds of the bark much resembling huge ants. On the disappearance of the sun beneath a cloud they secreted themselves, and when frightened dropped to the ground and attempted to hide. When the sun was very hot they sometimes escaped by flying. In 1914 they were found from July 12 to 16; and apparently the maximum abundance extends over a very short period.

Xylotrechus quadrimaculatus Hald. The first and only specimen I have ever taken was found on a pile of lumber at Monmouth, June 29, 1912, and appeared to be freshly emerged. This specimen is of a reddish-brown colour, and I have another from Orono, July 14, 1906, which is a light testaceous grey.

Calloides nobilis Say. I was greatly surprised to find five specimens of this fine beetle at sap on an oak stump at Monmouth, June 29, 1912.

Monohammus confusor Kirby. I have taken this species twice at Monmouth.

Monohammus marmorator Rand. A single specimen has been sent me from Wales, but I have not yet been able to find it myself.

Plagionotus speciosus Say. For thirteen years I have looked in vain for this species on the infested maples at Monmouth, and during this time I have received but two, both dismantled wrecks, from friends there. One year a friend cheerfully informed me that he had collected seventeen and was keeping them alive in a jar for me when his wife let them all out a few days before my arrival because it was "too cruel to keep the poor things shut up like that." On July 9, 1914, at South Paris I took my first specimen, and for a week I made regular trips two or three times a day from tree to tree around the village. I acquired fourteen specimens and a desire for more, besides arousing the curiosity of all the villagers. It is remarkable how inconspicuous these large and highly coloured beetles are, unless directly in the sun and low down on the tree. They are slow moving and I lost but one specimen seen, which escaped by flight from the ground while I was trying to dislodge a second one from a high limb by throwing my net at it.

Leptura nigrella Lec. The first specimen of this sombre insect I ever saw was a female which was taken in the mill yard at Monmouth, June 28, 1912. It was taken by a lucky swing of the net while in the air after an awkward leap from a pile of logs. When I had examined my catch I felt more than repaid for the shaking up of the undignified landing. A male was taken on a maple stub in a small clearing on July 17, 1914.

Leptura biforis Newm. A single specimen was taken on flowers at Monmouth, August 29, 1902.

Hoplosia nubila Lec. One specimen was taken on a log in the mill yard at Paris, July 12, 1913.

Oberea pallida Casey. This species has been beaten from *Alnus incana* in considerable numbers, both at Wales and Monmouth, on several occasions. The dates range from June 19 to the 29, and a single specimen was taken at Paris on July 10, 1910. This species seems to be abundantly distinct from any other *Oberea* and can be readily distinguished by the uniform colour of the entire insect, even the black callous spots of the pronotum become, in some cases, (not a sexual character as indicated in the description) nearly concolorous with the rest of the disk.

Donacia cincticornis Newm. A so-called variety of this species is found on the leaves of the yellow pond lily (Nuphar) in the coves of the lake at Monmouth, and it is also the common species of the lilies in the sluggish, winding streams of the meadow lands. It is a broad, depressed insect of a dark, violet-blue colour. They fly from one lily leaf to another when disturbed, keeping so close to the water that they are very hard to net; they also delay the start until the net has passed over them. In the open lake, if the boat is allowed to drift broadside across a patch of lilies when the waves are high, one can see this species shining like balls of quicksilver as they cling to the submerged pads, sometimes a foot beneath the water.

Donacia subtilis Kunze. This species is less common but is found in the sheltered coves of the lakes resting on the stems of the water grasses. I have taken them in the hand by leaning over the bow of the boat. Dates are June 21 to 25.

Donacia palmata Oliv. A very few specimens of this species have been taken at Monmouth, June 21 to 29.

Donacia torosa Lec. A series of a supposedly undescribed species which was swept from the grass of a wet meadow at Wales has turned out to be typical specimens of this form. It has been supposed to be a variety of *distincta*, but I think it will finally be given full rank. It is of a uniform dark blue or, as given in the description, blackish-violet colour. Dates are June 16, 1907, and June 13, 1909.

Hallica bimarginata Say. This well-known species appeared in such numbers on a small area of *Alnus* sprouts at Monmouth that I was curious to know how many could be taken. I selected two bunches of the bushes about three feet high, and swept them with six strokes of the net. In bottling the catch several escaped, but there remained 596 individuals. This does not quite equal the record of 600 odd specimens of *Phyllotreta sinuata* which were taken at one sweep from a bunch of *Cruciferae* at Framingham, Mass.

Eupsalis minuta Drury. One specimen of this species was taken on a red oak log in the mill yard, and a pair of them was once found industriously boring holes in a log of the same kind in the deep woods at Wales, July 23, 1908.

SOME CALIFORNIA BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

THE BEES RECORDED BELOW WERE RECEIVED FROM POMONA COLLEGE, CALIFORNIA.

***Perdita (Cockerellia) aureovittata*, n. sp.**

♀.—Length 8 mm.; robust, with dull white hair; head broad, dark bluish green, eyes slightly diverging below; mandibles bidentate, reddish in middle, pale yellow on upper side basally; labial palpi with first joint about 770 microns long, and last three together about 448; maxillary palpi slender, last joint orange, joints measuring in microns, approximately, (1) 192, (2) 160, (3) 144, (4) 96, (5) 96, (6) 104; clypeus piceous, sparsely punctured, with a large, pale yellow spot on each side, but none in middle; no supraclypeal mark; lateral face-marks pale yellow, consisting of rather small triangular patches at lower corners of face; flagellum light ferruginous beneath; mesothorax very minutely punctured, green in front and around margins, but black on disc; scutellum black, with fine punctures; rest of thorax dark blue-green; prothorax without yellow markings; legs dark brown, the anterior femora with a small yellow spot at apex; middle femora sharply keeled beneath; tegulae pale testaceous; wings hyaline, nervures and stigma light ferruginous; b. n. falling far short of t. m.; marginal cell very oblique at end, so much so that it could be described as pointed; abdomen with five very broad, entire, bright orange bands, those on segments 2-4 notched anteriorly in middle, and all more or less excavated behind sublaterally; hair at apex pallid, with a brownish tint; venter dark brown.

Hab.—Claremont, California (*Baker*). Pomona coll. 226. Related to *P. sparsa* and *P. albipennis*, but readily known by the face-markings, broad, orange abdominal bands, etc.

***Zacosmia maculata* (Cresson).**

Claremont (*Baker*); Pomona coll. 163. This is the true *Z. maculata*; a male which I collected at Juarez (Chihuahua), Mexico, May 12, may be taken as typical of a new subspecies *desertorum*. November, 1916.

It is rather small, with the light hair very pale; mesothorax more closely punctured, the brown marks on its anterior part faint and suffused; dark marks of abdomen paler, the spots dilute brownish, evanescent posteriorly; second segment with a black dagger-like mark in middle, but the dark basal area so reduced as to be almost entirely overlapped by the first segment.

Tniepeolus pomonalis, n. sp.

♂.—Black, with the usual markings on thorax and abdomen warm ochreous, the band on sixth abdominal segment creamy-white; legs, antennæ and tegulæ black. Length about 12 mm.; robust. Superficially, this looks almost exactly like *E. remigatus* Fabricius, from Virginia, but it differs as follows: mesothorax anteriorly with two well-developed longitudinal bands, longer than in *remigatus* (these joined, as in *remigatus*, with the band surrounding mesothorax except in middle of front); median black area on first segment pointed at sides; apical plate of abdomen much larger; insect distinctly more robust. There is also a close resemblance to *T. concolor* Rob., from Illinois, but *T. pomonalis* differs thus: clypeus with no median ridge; light hair of face limited to a certain amount on clypeus and lower part of supraclypeal area, and a large band on each side of antennæ; bare part of pleura very densely punctured all over; a continuous hair-band all round mesothorax except in anterior middle; black area on first abdominal segment not sharply limited at sides; abdominal bands much broader; apical plate much larger. From *T. texanus* var. *nigripes*, it is known by the clypeus, which is densely minutely punctured, and has scattered larger punctures, which are shallow. *T. superbus* (Provancher), described from Los Angeles, I have never seen, but *T. pomonalis* differs from the description in being larger, with no spot on tegulæ, stripes on mesothorax too large to be described as "two little lines," and no spots at sides of metathorax. The middle of the abdomen beneath has two silvery-white bands close together, the first with more than the middle third missing; on outer face of middle tibiæ anteriorly is a small band of orange-fulvous glittering hair; the wings are very dark; there is pale hair along the border of metathoracic enclosure.

Hab.—Claremont, California, (*Baker*). Pomona coll. 160. The mesothoracic bands or stripes distinguish this from *T. nigriceps* Smith, and the marking of the first abdominal segment is different, though that of the second agrees with *nigriceps*.

***Nomia arizonensis angelesia* Ckll.**

Claremont (*Baker*). Pomona coll. 196.

***Andrena plumifera*, n. sp.**

♀.—Length about 10 mm; rather robust, black; head and thorax with abundant ochraceous hair, pallid on face, cheeks and under side of thorax, becoming fulvous on thorax above; facial quadrangle broader than long; process of labrum broadly rounded; clypeus entirely dull, hairy, the minute punctures forming transverse lines, no median ridge; facial foveæ broad, ochreous, extending below level of antennæ, the lower end not sharply defined; third antennal joint 416 microns long, 4 and 5 together 365, 4 to 6 together 560; flagellum very obscurely brownish beneath; mesothorax and scutellum dull and granular; area of metathorax small, rather conspicuously rugose; tegulæ piceous with a rufous spot; wings greyish; stigma dark reddish, slender, lanceolate, not over half diameter of marginal cell; b. n. meeting t. c.; second s. m. receiving first r. n. a little beyond middle; third s. m. very long; legs black, with pale hair, brown on middle and hind knees; middle and hind basitarsi broad; scope of hind tibiæ ample, dense, strongly plumose (collecting pale yellow pollen); abdomen somewhat shining, with a microscopically reticulate surface and excessively minute punctures; segments 2 to 4 with broad, dense white hair-bands, that on 2 broadly and abruptly interrupted in middle; apex with very pale purplish-grey hair, almost a lilac shade.

Hab—Claremont, California (*Baker*; Pomona coll. 199). A species of the subgenus *Pterandrena*, running in Viereck's key (*Canad. Entom.*, 1904, p. 227) to *A. nudimediocornis* Vier., which differs by the distinctly punctured dorsulum. Superficially, it looks exactly like *A. bridwelli* Ckll., but the surface of the abdomen is entirely different. It is smaller than *A. pecosana* Ckll., with the clypeus quite different.

A REMARKABLE NEW SPECIES OF PHORA (*TRINEURA*).

BY CHARLES T. BRUES, BUSSEY INSTITUTION, HARVARD UNIVERSITY.

The genus *Phora*, more generally known under the name of *Trineura*, includes a small number of species of velvety black colour. Quite recently Prof. J. M. Aldrich received from Manitoba a series of specimens which he at once recognized as an undescribed species. Instead of the velvety black colour so characteristic of the other members of the genus, the mesonotum of the male is satiny blue-green, while the remainder of the body exhibits a less distinct tinge of the same colour. Structurally, the species departs in no striking way from its congeners.

On account of its peculiar appearance he suggested that I describe it at the present time.

***Phora* (= *Trineura*) *viridinota*, sp. nov.**

Male.—Length 1.5 mm. Black; mesonotum and scutellum blue-green and opaque; abdomen almost black, but slightly tinged with greenish; front greyish green; knees of four anterior legs and front tibiae and tarsi brownish testaceous; wings hyaline, costal vein black, first and third veins dilute piceous. Front slightly more than twice as high as broad, its bristles large and strong except the lowest pair, which are half the size of the others. Ocelli in an equilateral triangle, the posterior ones as far from one another as from the eye-margin. Antennae small, oval, with bare arista. Palpi very small, half as long as the antennae, with stout, closely placed, although small, bristles. Postocular cilia enlarged below. Mesonotum sparsely clothed with bristly hairs; with a single pair of very prominent dorsocentral macrochaetae in front of the lateral angles of the scutellum. Scutellum subtriangular, nearly as wide as long, with one pair of stout bristles and a very weak pair anterior to the stout ones. Propleura bristly along the entire posterior edge, the bristles larger near the coxa; mesopleura bare. Abdomen with the second and sixth segments elongated, the sixth most noticeably so. Hypopygium, when viewed from the side, with the median plate extending posteriorly into a finger-like projection which is longer than in *P. aterrima*. Anterior legs with the tarsi not wider than the tibiae; metatarsus one-third as long as the tibia; second tarsal joint a little widened, less than half as broad as long; third twice, and fourth nearly twice as long.

November, 1916.

as broad. Middle tibiae with five or six long bristles along the basal two-thirds of the outer edge and a single bristle at the basal third on the anterior surface; longer spur two-thirds as long as the metatarsus. Hind tibia with a single bristle on the anterior surface at the basal two-fifths and a short one just before the apex; longer spur scarcely longer than the width of the metatarsus. Wings with the costal vein reaching to the middle, its bristles rather long and sparse, about 17 in each series, and each bristle about as long as the greatest distance from the costa to the first vein; first vein bending sharply and then slanting to the costa, its apex nearer to the tip of the costa than to the humeral cross-vein; fourth vein weakly curved on its basal half, straight beyond, ending barely before the wing tip; fifth and sixth weak, nearly straight; seventh obsolete. Halteres black.

Female.—The front is broader, and the body is black, with only the slightest tinge of the green colour of the male. The front tarsi are more distinctly thickened, the second and following joints being slightly wider than the tibia; second joint distinctly less than twice as wide as long; third one-third longer than wide.

Described from four specimens; type ♂, two ♂ paratypes and one ♀ paratype. Treesbank, Manitoba, Canada, (N. Criddle) May 30. Type in the collection of the Entomological Branch, Dept. of Agriculture, Ottawa.

As Professor Aldrich remarked in his letter sent with the specimens, this is the only Phorid which shows a distinct green colour, the other members of the family being black, brown, reddish or yellow of various shades and combinations. Only one other form with which I am familiar, *Melaloncha pulchella* Brues, departs from this type of coloration, the abdomen having bands of bluish pruinosity.

BOOK REVIEW.

RHYNOPHORA OR WEEVILS OF NORTHEASTERN AMERICA.

BY W. S. BLATCHLEY AND C. W. LENG. THE NATURE PUBLISHING CO., 1558 PARK AVENUE, INDIANAPOLIS, INDIANA, U. S. A.

Those who possess the monumental work of Prof. Blatchley on the Coleoptera of Indiana will rejoice to learn that he has completed his great task by publishing the present volume on the Rhyncophora, which were not included in the former book. By

associating with him Mr. Leng, who had for some time been working on the Weevils of the Atlantic Coast, he has been able to extend the scope of the volume so as to include the United States and Canada, east of the Mississippi River, thus going far beyond the bounds of the State of Indiana, to whose Coleopterous fauna the previous book was confined. The volume contains 682 pages and is illustrated with 155 figures.

In their introduction the authors state that their "primary object has been to furnish to students and tyros in Entomology a simple manual which would enable them in the most direct way possible to arrange, classify and determine the scientific names of the weevils in their collections." In accordance with this design the work begins with an explanation of the external anatomy of these beetles, with clear figures of the various structures. After a careful study of these details the reader will be able to go on and make good use of the book. Four families are recognized, namely, the Brenthidæ, Anthribidæ, Curculionidæ and Scolytidæ; to the third of these over five hundred pages are devoted, and descriptions are given of 856 species distributed among thirteen sub-families.

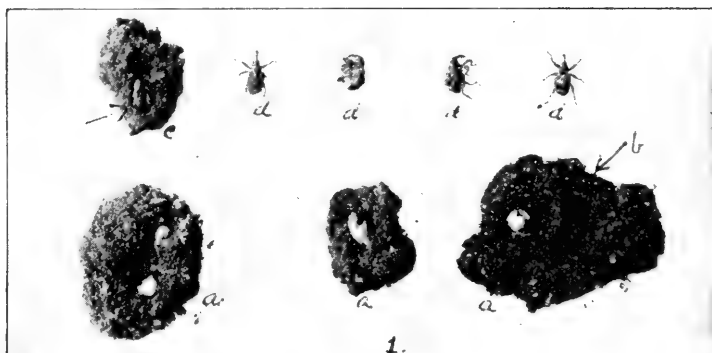
According to the plan of the work, a general description of each family is given, followed by keys to the genera, which in turn are described and usually illustrated with a characteristic figure, assisting materially in their recognition. After the genus a key is given to the species, followed by descriptions, with an account of their geographical range, habits, dates of capture and other particulars. By a careful use of the keys, a species may be run down and a specimen identified with comparatively little difficulty.

At the end of the volume there is a Bibliography of the works that have been referred to, and Indexes to the Plants affected by weevils, the Families, Sub-families, Tribes and Genera.

We may justly congratulate the authors on the completion of such an excellent work, which must have involved a very large amount of most painstaking labour. The book will be eagerly welcomed by all entomologists who are interested in this division of the Coleoptera, and should render more popular the collection and study of the Rhyncophora now that facilities for doing so are admirably supplied.

C. J. S. B.

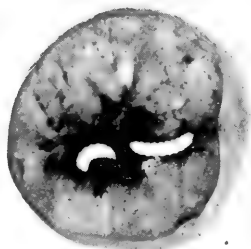




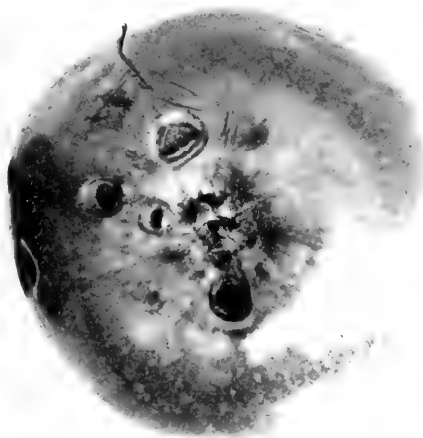
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POPULAR AND PRACTICAL ENTOMOLOGY.

THE PLUM CURCULIO IN ONTARIO, NATURE AND EXTENT OF THE INJURIES, CONDITIONS FAVORING THE INSECT, AND MEANS OF CONTROL.

PART I—NATURE OF THE INJURIES.

BY L. CAESAR, GUELPH.

The Plum Curculio is found practically all over the fruit-growing portions of Ontario, and is one of our most destructive and, under some circumstances, difficult insects to control. The name "Plum Curculio" is misleading because the insect attacks not only plums but apples, pears, cherries, peaches, apricots, quinces and, on rare occasions, gooseberries. In our experience apricots are worst attacked, then plums and sweet cherries; after these sour cherries, apples, pears, peaches and quinces in the order named. We have only in one locality seen gooseberries attacked.

Kinds of Injuries.—There are several kinds of injuries: First, there is the injury due to egg laying and the accompanying crescent-shaped scar made by the female almost immediately after the act. There may be anywhere from one to a dozen or more eggs, each with its crescent, to a single fruit. If such fruit does not drop prematurely, it is usually either disfigured by the enlargement of the crescent into a brown scar or calloused area, which by its nearly semi-circular shape still shows its origin, or is deformed by a depression caused by the growth being checked at the point of oviposition but being continued all around it. There may be several of these depressed areas, some of them quite deep, on a single fruit. This type of deformity is very common on apples and pears but much more rare on other fruits. Some of the apples and pears are so much misshapen that they are totally unfit for market. Such fruit is often spoken of as being "knobby." The pear has the habit of producing stone cells at the injured places.

These spots become so hard and gritty that they are likely to break one's teeth if an attempt is made to bite through them.

The second injury is caused by the early feeding habits of the first generation of beetles, that is the over-wintered beetles. Both males and females during the egg-laying season feed upon the fruit, eating out little holes of about 1-24th of an inch or a little more in diameter. In our observations these feeding punctures were not nearly so numerous as the crescent-shaped cuts, but several investigators have found them quite as numerous. These punctures, too, seem to lead to the same kind of deformities in apples and pears as we have described above.

The third injury is the dropping of most of the infested fruit. If the larva, or grub, that hatches from the egg lives, practically all kinds of fruit except cherries drop prematurely. Fortunately not only does a very large percentage of the eggs fail to hatch, but also a great many of the larvæ themselves die in the fruit soon after hatching, so that these two things lessen the total amount of dropping. Premature falling of fruit extends over a period of more than a month, but most of it takes place before the apples are more than about one inch in diameter. On some trees sprayed for Codling Moth we found over 90% of all the early drops were due to the Curculio. When the fallen fruit was cut through, it was seen that the grubs by the time they were mature had eaten large areas inside, as large and as unsightly in many cases as those caused by the Codling Moth larvæ. The infested cherries, which, as has been said, remain on the trees, usually become sunken and darkened on one side, thereby clearly revealing the work of the insect. Cherries containing the Cherry Fruit-fly larvæ do not always have some outward manifestation of the presence of an insect.

A fourth injury is caused by the late summer and autumn feeding of the new generation of beetles. This injury is common on apples and peaches, but rare on other fruits. On the apple the beetle eats a small, round hole through the skin, and then inserts its long proboscis and excavates the flesh as far as it can reach. The result is a small, circular, brown area on the surface with a hole in the centre and a cavity beneath. Sometimes the beetles work

their way through the skin and enlarge the cavity until it is nearly quarter of an inch in depth and about the same in breadth. Not infrequently, if this hole is on the sunny side of the apple, its borders for some distance out will be reddened by the sun and thus the injury rendered very conspicuous. Many fruit-growers mistake such injuries for the side work of the Codling Moth, but the distinction between the two is easy to make, because the Codling Moth goes right into the core, while this injury is seldom more than quarter of an inch deep. There are often many of these injuries in a single fruit; for instance, I have counted as many as forty on one apple. In such cases several injuries usually coalesce and make a much disfigured fruit. In the writer's experience, rough-skinned varieties seem to be more subject to attack than very smooth or glossy ones, possibly because the former afford a firmer foothold for the beetles when feeding.

Peaches are also sometimes quite severely marred by this fall feeding. A peach that lies on my desk as I write has eighty curculio scars on it, all made by the new generation of beetles during August and September. From half of these, including all the larger and deeper ones, gum is exuding. The appearance of the injuries on the peach and apple differs in that on the peach the beetles usually remove all of the skin above the cavity which they excavate; the injured area, too, is often quite irregular in outline, and seldom goes so deep as in the apple. In the apples the skin, as we have stated, usually covers the excavation except for the small hole in the centre where the beak is inserted, and the injured area is usually uniformly circular in outline.

A fifth injury is brought about by the wounds made by the beetles, both in the earlier and later parts of the season, in plums, cherries and peaches affording exposed areas for the introduction of the spores of the Brown Rot disease. The skin of fruits ordinarily serves to a very great extent as a protection against the introduction of disease, but, if the skin be ruptured, the spores, which are carried by the wind everywhere through the orchard, have a good chance to light on the moist surface and germinate before a callous can be formed by the fruit over the wound to protect it.

EXPLANATION OF PLATE XI.

- Fig. 1. a. a. a. Small lumps of earth showing the pupæ in their little oval chambers; b. a dark circular area in the lump showing the empty chamber after the pupa has been removed; c. an adult beetle after transforming and still in the pupal chamber; d. d. d. d. adult beetles—all natural size.
- Fig. 2.—Apple showing the crescent-shaped cuts made by the females after laying eggs—natural size.
- Fig. 3.—Full grown larvæ and their work in a fallen apple—natural size.
- Fig. 4.—Fall or late summer injuries on apple made by the feeding of the new generation of beetles. These injuries though natural size are larger than the average.
- Fig. 5.—Fall or late summer injuries made on peach by the feeding of the new generation of beetles—natural size.
(To be continued.)

NEW INDIAN GALL MIDGES.

BY E. P. FELT, ALBANY, N. Y.

Below are characterized some exceptionally interesting new species and genera occurring in a small collection recently submitted for study by Prof. T. Bainbrigge Fletcher, Imperial Entomologist, Agricultural Research Institute, Pusa, Bihar. India.

Colpodia fletcheri, n. sp.

The midge described below is provisionally referred to this genus because the sum total of the characters would suggest this group rather than another, though the cross-vein is almost parallel with costa, and there is an approach to a condition found in the genus *Didactylomyia* Felt. The specimen was labeled "Pusa, Bihar, India, U. Bahadur, January 1, 1916." It is easily distinguished by the peculiar, foliate, curved production of the terminal clasp segment and the tri-lobed, foliate apex of the harpes.

Male.—Length 1.25 mm. Antennæ one-half longer than the
December, 1916

body, rather thickly haired; 15 segments, the fifth with a whitish transparent stem twice the length of the blackish subcylindric basal enlargement, the latter with a well marked, low circumfilum at the basal third and a moderately thick subapical whorl with long, stout setæ; terminal segment slightly produced, with a length a little over twice its diameter, the apex broadly and irregularly rounded. Palpi: first segment irregular, quadrate, the second a little longer, the third twice the length of the second, more slender, and the fourth a little longer than the third. Mesonotum fuscous yellowish. Scutellum reddish yellow, postscutellum reddish. Abdomen rather thickly haired, reddish brown. Wings long, slender as in *Colpodia*, the cross-vein nearly parallel with costa, the fifth vein uniting with the posterior margin at the distal third, its branch at the basal third; halteres yellowish transparent. Coxæ fuscous yellowish. Legs mostly dark straw, the three distal tarsal segments of the hind legs yellowish white; claws moderately long, strongly curved, unidentate, the pulvilli about half the length of the claws. Genitalia; basal clasp segment short, very broad, quadrate, with an irregular, fingerlike, heavily chitinized process at the internal distal angle; terminal clasp segment broad at base, tapering and curving irregularly to a slender, curved, somewhat foliate apex; dorsal and ventral plates indistinct. Harpes greatly produced, heavily chitinized, the distal free half tapering slightly to an irregularly expanded, tri-lobed, foliate appendage. Type *Cecid.* 1696.

Harpomyia, n. gen.

This genus was erected for a species belonging in the *Dasyneura* series having 12 antennal segments and may be most easily recognized by the greatly produced, somewhat sickle-shaped harpes of the male. These organs have a length greater than the entire hypopygium and extend posteriorly like a pair of scissor blades. Type *H. indica*, n. sp.

Harpomyia indica, n. sp.

The midges described below were labeled as having been reared from larvæ found under the lining of a felt cap, August 19, 1915, U. Bahadur.

Male.—Length 1 mm. Antennæ nearly as long as the body, thickly haired, yellowish brown; 12 segments, the fifth with a stem

one-half the length of the subcylindric basal enlargement, which latter has a length about three-fourths greater than its diameter, sub-basal and apical circumfili and subapically a moderately thick whorl of long, moderately stout setæ; terminal segment slightly produced, narrowly conical, with a length about three times its diameter. Palpi: first segment short, subquadrate, the second with a length three times its width, moderately broad, the third one-half longer than the second, more slender, and the fourth one-half longer than the third, more slender, the distal three sparsely haired. Eyes large, holoptic. Mesonotum pale yellowish brown, the submedian lines bright yellowish. Scutellum dark brown, postscutellum yellowish brown. Abdomen yellowish transparent, the genitalia relatively very large and subdorsal. Wings hyaline, subcosta uniting with the narrowly scaled costa near the basal third, the third vein a little before the apex; the fifth vein, indistinct distally, unites with the posterior margin near the distal third, its branch near the basal half; halteres whitish transparent. Coxæ, femora, tibiæ and the two basal tarsal segments mostly whitish or whitish transparent, the three distal tarsal segments dark brown; claws long, slender, moderately curved, unidentate, the pulvilli about three-fourths the length of the claws. Genitalia: basal clasp segment short, stout, curved, the sides nearly parallel, the apex roundly emarginate, the distal angles produced, the internal being longer and broader; dorsal and ventral plates indistinct, the harpes produced as two long, slender, chitinized, somewhat sickle-shaped pieces having a length greater than the entire hypopygium and extending posteriorly somewhat like a pair of scissors.

Female.—Length 1 mm. Antennæ extending to the base of the abdomen, rather thickly haired, yellowish brown; probably 12 segments, the fifth subsessile, broadly subconical, with a length about one-half greater than its diameter; low circumfili at the basal third and apically, a sparse basal and a scattering subapical whorl of long setæ; terminal segment reduced, broadly conical and tapering to a broadly rounded apex. Palpi: first segment with a length three times its diameter, the second a little longer, broader, the third twice the length of the second, more slender and the fourth one-fourth longer than the third, all sparsely haired. Eyes holoptic,

purplish brown. Ovipositor short, stout, the terminal lobes narrowly oval, with a length three times the width and sparsely setose. Other characters practically as in the male.

Pupa.—Length .9 mm., moderately stout, probably yellowish, the antennal cases extending nearly to the base of the abdomen, the wing cases to the third abdominal segment, and the posterior leg cases almost to the tip of the abdomen; the thoracic horns long, filamentaceous, the posterior extremity with submedian, conical processes.

Larva.—Length 2 mm., moderately slender; extremities, anterior conical, posterior broadly rounded, the head and breast-bone not recognizable in the preparation.

Egg Shell.—Length .5 mm., narrowly oval, the surface with numerous minute, hexagonal thickenings, the latter with minute spines arising mostly in or near the angles.

The large size of the egg shell suggests that the females of this species, like *Miastor*, produce comparatively few eggs.

Indodiplosis, n. gen.

This genus approaches *Erosomyia* Felt, in the greatly produced and broadly rounded posterior area of the wings, and is readily distinguished therefrom by all of the claws being unidentate, a feature unique so far as known to us, among the sub-tribe bifili. Type *I. mangiferæ*, n. sp.

Indodiplosis mangiferæ, n. sp.

Gall midges were labeled "March 23, 1914, in galls of Mango leaf. Pusa, A. H. C., No. 1023." A female, presumably conspecific, was received from the same source and labeled "C. No. 100, Mango leaves, Pusa, Bihar, T. Ram, September 26, 1915." These dates would indicate the possibility of there being two generations annually, though the appearance of the female may have been erratic and induced by abnormal conditions.

Male.—Length .75 mm. Antennæ nearly twice the length of the body, thickly haired, light brown; 14 segments, the fifth with the stems equal and one-fourth greater than their diameters respectively; basal enlargement subhemispheric, the distal enlargement subglobose, each with a sparse whorl of long, stout setæ and moderate circumfili, the loops, about eight in number, being

moderately stout and extending nearly to the base of the next enlargement. Palpi: the first segment slender, irregular, second narrowly oval, with a length about twice its diameter, the third a little longer and more slender than the second, the fourth one-half longer than the third, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen rather thickly haired, brownish yellow, the genitalia darker. Wings hyaline, subcosta uniting with the margin near the basal third, and with the inclosed cell clouded with a chitinous thickening, the third vein nearly straight, joining the margin at the apex of the wing, the fifth indistinct distally, uniting with the posterior margin at the distal third, its branch at the basal third; halteres pale yellowish. Legs mostly dark straw; claws long, slender, unidentate, the pulvilli nearly as long as the claws. Genitalia: basal clasp segment long, slender, with a rather distinct internal, quadrate lobe basally; terminal clasp segment somewhat swollen at the base, irregular and tapering to an obtuse, spurred apex; dorsal plate short, broad, broadly and triangularly emarginate, the lobes narrowly rounded and sparsely setose; ventral plate moderately long, broad, deeply and narrowly and triangularly emarginate, the lobes rather broad and tapering slightly to a narrowly rounded, setose apex; style long, stout, narrowly rounded apically. Type Cecid. 1686.

Exuvium.—Length 1.5 mm., moderately stout, whitish transparent, the antennal cases with indistinct basal processes internally and extending to the second thoracic segment, the wing cases to the fourth abdominal segment, and the leg cases to the fifth abdominal segment, respectively; the dorsum of the abdominal segment rather thickly and uniformly covered with minute, chitinous forks; posterior extremity broadly rounded, somewhat lobed and incised apically.

Female.—Length 2 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark reddish brown; 14 sessile segments, the fifth with a length one-half greater than its diameter, subcylindric, with a rather thick basal whorl of stout setæ, a scattering subapical whorl of more slender setæ and at the basal third and apically, low, unusually broad circumfili, the distal filum with the loops somewhat elevated and reaching nearly to the base of the following segment; terminal segment somewhat produced and

tapering to an irregular, narrowly rounded apex. Mesonotum dark brown. Scutellum reddish brown, postscutellum yellowish. Abdomen mostly dark red, the wings subhyaline and the wing venation practically as in the above described male and with the costal cell decidedly more obscured; halteres yellowish basally, brownish apically. Coxæ and legs mostly brownish straw. Ovipositor short, up-turned, the terminal lobes subquadrate, with a length one-fourth greater than the width and bearing a few long, slender setæ and numerous shorter ones. Other characters practically as in the above described male. Cecid. 1695.

This sex is provisionally associated with the preceding.

Streptodiplosis, n. gen.

A remarkable male referred to this genus suggests, in the somewhat broad wings, an affinity with *Lobopteromyia* Felt, from which it is easily separated by the very peculiar genitalia. Type *S. indica*.

Streptodiplosis indica, n. sp.

The one male described below was labeled "number 38, Kusti, Kalan Estate, North Wynaad, South India, February 16, on leaves infested by *Mytilaspis piperis* Green. U. Bahadur." It is probably predaceous upon this scale insect.

Male.—Length .75 mm. Antennæ twice the length of the body, rather thickly haired, pale grayish, the stems whitish transparent; 14 segments, the fifth having stems with a length two and one-half and three and one-half times their diameters, respectively; basal enlargement globose, with a sub-basal whorl of long, stout setæ and a subapical circumfilum, the moderately stout loops extending nearly to the globose distal enlargement, which latter bears similar setæ and loops; terminal segment having the basal enlargement oblate, a stem with a length about three times its diameter and the distal enlargement prolonged, with a length over twice its diameter and tapering at the distal third to an obliquely rounded apex. Palpi apparently quadri-articulate, the first segment small, subquadrate, the second with a length over twice its diameter, the third one-half longer, more slender, and the fourth one-half longer and more slender than the third. Face white. Mesonotum, scutellum, postscutellum and abdomen

yellowish white, the abdomen basally and laterally with an irregular, black marking, possibly due to the body contents. Wings hyaline, broad, with a length hardly twice the width, subcosta uniting with the anterior margin at the basal third, the third vein with its distal fourth curved posteriorly, a little before the apex of the wing, and the fifth vein joining the posterior margins at the distal fourth, its branch at the basal half; the forks of the fifth vein subobsolete and indistinct; halteres whitish transparent. Coxæ pale yellowish; legs mostly a very pale straw; the small claws with a length about half the diameter of the distal tarsal segment, simple, the pulvilli about as long as the claws. Genitalia large, extremely complex, greatly twisted; basal clasp segment long, irregular, swollen basally, slender apically; terminal clasp segment subapical, slender, irregular, the distal third somewhat expanded and thickly and finely setose; dorsal plate long, deeply and triangularly emarginate, the lobes slender, sparsely haired and extending nearly to the apex of the genitalia; ventral plate not recognized, the harpes strongly chitinated, convolute, irregularly S-shaped. Type Cecid. 1693.

SOME BEES FROM MADAGASCAR.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The following bees were received from the Queensland Museum; I do not know who collected them.

***Pachymelus micrelephas* Smith.**

Miarinarivo, (Queensl. Mus. 9).—*P. sorar* Mocsary is evidently a synonym.

***Pachymelus grandidieri* n. sp.**

♀.—Length 23.5 mm., anterior wing 18; robust, black, with black, fulvous and pale ochraceous hair; tegument of clypeus (which is polished and sparsely punctured, not gibbous in middle), labrum, and greater part of basal half of mandibles orange; mandibles bidentate, and with a subapical fulvous patch; eyes large, brownish red; facial quadrangle longer than broad; scape short, red, with a broad, yellow stripe in front; flagellum ferruginous, becoming chestnut above, third antennal joint very nearly as long as the

next four combined; hair of head entirely fulvous, very bright and abundant on occiput; prothorax with dark seal-brown hair; mesothorax densely punctured, covered with short, black hair, which imperceptibly shades into dark brown anteriorly, the extreme hind margin with a little ochraceous hair; scutellum and metathorax covered with ochraceous hair, fulvous laterally; scutellum dark reddish, bigibbous in middle, the bosses rounded and polished, free from hair; pleura with black hair, except anteriorly below, where it is long and fulvous; tegulæ large and black; wings fuliginous, paler and yellower basally; first r. n. meeting second t. c; b. n. falling far short of t. m.; legs dark red, with rich, fulvous hair; abdomen dullish, with very minute punctures and scattered larger ones; surface appearing black and nearly nude (though with appressed black hair on third segment) as far as middle of fourth segment, but beyond that the abdomen is covered with long, fulvous hair; venter dark reddish, the segments fringed with fulvous hair.

Miarinarivo, (Queensl. Mus. 17). A beautiful species, nearest to *P. heydenii* Sauss., but differing by the lack of fulvous hair on first abdominal segment. It is also appreciably smaller, although it is a female and *heydenii* was described from a male. It is named after the author of the great work on Madagascar, in which Saussure described several species of the same genus.

***Crocisa subcontinua* Saussure.**

Miarinarivo, (Queensl. Mus. 49).—I have also a specimen collected in Madagascar by Hildebrandt.

***Anthophora antimena* Saussure.**

Miarinarivo, (Queensl. Mus. 47).—The specimen, a female, is so grey in tone as to appear almost greenish, and the wings are dusky. Possibly it represents a distinct race, but more material is desirable.

***Megachile piliceps* Saussure.**

Miarinarivo, (Queensl. Mus. 51).—This species (male) is superficially almost exactly like *M. perbrevis* Cress., from Texas.

THE NORTH AMERICAN SPECIES OF *DIBRACHYS* (IN THE NORTH AMERICAN SENSE—*CÆLOPISTHOIDEA* GAHAN) WITH A NOTE ON *URIELLA* ASHMEAD.

BY A. A. GIRAULT, GLENNDALE, MD.

The genus *Dibrachys*.

Antennæ inserted a little above the ventral ends of the eyes but distinctly below the middle of the face. Mandibles 4-dentate. Pedicel longer than funicle 1. Propodeum with little or no neck. Abdomen conic-ovate, pointed. Postmarginal and stigmal veins subequal, short. Segment 2 of abdomen largest, not long. Propodeum tricarinate. Clypeus somewhat produced, somewhat sinuate at apex, striate.

Spiracular sulcus absent.

Coxæ and femora and the antennæ except the scape, concolorous; funicle joints very short, all wider than long, 1 smallest; second ring-joint twice the size of the first. Postmarginal vein slightly shorter than the stigmal.....*apatelæ* Ashmead.
(=*pimplæ* Ashmead.)

Coxæ and the flagellum except much of the pedicel, concolorous; funicle 1 quadrate or somewhat longer than wide, longest, the ring-joints very unequal. Postmarginal vein usually slightly longer than the stigmal; propodeal spiracle reniform. Segment 2 of abdomen only slightly notched at meson caudad as in *apatelæ*. Male antennæ entirely yellow, (compare *boucheanus* Ratzeburg).....*clisiocampæ* Fitch.
(=*nigrocyanus* Norton; =*chionobæ* Howard; =*nematicida* Packard; =*gelechiæ* Webster.)

The same but male flagellum

black.....*cladiæ* Gahan.

The species *apatelæ* and *pimplæ* were described as *Arthrolytus*; *clisiocampæ* Fitch as *Semiotellus*; *nigrocyanus* Norton as *Cleonymus*; *nematicida*, *chionobæ* and *gelechiæ* as *Pteromalus*; and *cladiæ* as *Cælopisthoidea*.

Uriella rufipes Ashmead. (Genotype)

Antennæ inserted below the middle of the face but somewhat
December, 1916

above the ventral ends of the eyes, 13-jointed with two ring-joints, the club normal, the pedicel subequal to funicle 1, twice longer than wide at apex. Genal suture distinct. Clypeus sinuate, at the meson with a distinct, sharp tooth; clypeus subglabrous, nonstriate. Caudal tibial spurs distinct, *double*. Venation as in *Pteromalus* but the marginal vein is thickened a little at base. Mandibles 3- and 4-dentate. Otherwise as in *Habroclytus rhodobæni* Ashmead, but the median carina of the propodeum is absent (the lateral distinct), and the spiracular sulcus is only somewhat indicated by a hollow (no true sulcus). Has nothing to do with *Homoporus* or *Phanacra*, and is a miscogasterid of the present Metastenini.

THE OCCURRENCE OF *NEODEROSTENUS* GIRAULT IN NORTH AMERICA (HYMENOPTERA).

BY A. A. GIRAULT, GLENNDALE, MD.

A species from the woods, June 4, 1916. The abdominal petiole in this American species is transverse-linear.

***Neoderostenus bipunctatus*, new species.**

Female.—Length 0.95 mm.

Brassy metallic green, the wings hyaline, the venation dark, the legs and scape (except the middle and caudal coxæ except at extreme apex), white. Head and thorax densely scaly, the scutum scaly-punctate, the scutellum with a compound, 3-foveate puncture at middle between meson and lateral margin (and sometimes with another puncture caudo-mesad of the first), somewhat as in the Australian *Achrysocharoides sarcophagus* Girault. Parapsidal furrows at cephalic sixth mere sutures, thence subglabrous, rather broad grooves. Propodeal spiracle minute, round, cephalad (but over its own diameter from the cephalic margin). Propodeum subglabrous. Postmarginal vein no longer than the short stigmal, the marginal fringes of the fore wing very short. Funicle joints subequal, each about twice longer than wide, a third longer than the pedicel which is a little longer than club 1; terminal spine of club distinct. Mandibles 5-dentate, the two outer teeth large, subequal, the inner three subequal, minute.

One female by sweeping, Glennedale, Maryland.

Type.—Catalogue No. 20314, U. S. N. M., the female on a tag, the head on a slide.

December, 1916

A NEW GENUS OF OMPHALINE EULAPHID CHALCIS-
FLIES FROM MARYLAND.

BY A. A. GIRAULT, GLENNDALE, MD.

Euderomphale, new genus.

Female.—Form of *Chrysocharies*. Head (cephalic aspect) rounded. Antennæ inserted at the clypeus, clavate, 8-jointed, with two large ring-joints and one funicle, the pedicel longer than the funicle and ring-joints combined. Parapsidal furrows complete, much curved, the parapsides ovate. Scutellum simple, much wider than long, short-hemispherical. Propodeum short, noncarinate, the spiracle minute, round, cephalad. Marginal vein subequal to the submarginal, the postmarginal absent, the stigmal rather long, linear. Marginal fringes of the fore wing moderate (a fifth of the greatest wing width). Mandibles acutely, equally bidentate.

Euderomphale fuscipennis, new species. (Genotype.)

Female.—Length 0.90 mm.

Metallic purple, the knees very narrowly and the first three tarsal joints white, the cephalic tibiae brownish. Fore wings smoky under the whole of the marginal vein, the distal margin of the infuscation oblique but entire. Venation fuscous; base of fore wing more or less smoky. Caudal wing infuscated like the fore wing, with about eight lines of discal cilia where widest (at apex of the marginal vein). Body reticulate, scaly, shining. Scape long, obclavate, the pedicel over twice longer than wide at apex; ring-joint 2 twice the size of 1; funicle cup-shaped, subquadrate, over twice the size of the ring-joints united; club conic-ovate, and with a distinct terminal spine which is nearly as long as the joint which bears it; club as long as the scape or as the flagellum (funicle plus pedicel and the ring-joints).

One female, Glenndale, Maryland; from a neglected meadow, by sweeping, June 22, 1916.

Type.—Catalogue No. 20349, U. S. N. M., the specimen on a slide.

December, 1916

THE SHELL-BARK HICKORY MEALY-BUG.

BY A. H. HOLLINGER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

***Pseudococcus jessica*, sp. nov.**

The writer names this new species of Coccidæ in honour of his wife.

Young Larvæ.—About .5 mm. long when born, and covered with a thin, transparent egg-shell; about .25 mm. wide; oval, broadly rounded at cephalic end and slightly tapering from the fore part of abdominal region to the anal lobes; anal lobes each bearing one short hair; colour: reddish brown on dorsal surface, but orange-brown on the ventral surface, due to the colour of the legs and antennæ; with transmitted light through prepared slides the body appears orange-brown; antennæ six-segmented, bearing numerous hairs; eyes reddish or purplish in colour and situated just behind the peduncles of the antennæ; quite active; body covered with a fine, white, powdery, waxy secretion except at articulation of body segments.

Adult Female.—4 to 6 mm. long; 2 mm. high; 2.5 mm. broad; generally hemispherical in outline, flattened ventrally, and sometimes dorsally when crowded between the bark and wood; colour: purplish blood-red (about the same as that of the woolly aphis—*Schizoneura lanigera*) covered with a relatively thick deposit of white, waxy, secreted powder; no lateral fringe of white waxy exudation, nor any hairs, nor secreted waxy, glassy filaments as in certain other mealy-bugs; segmentation of body delineated by thinner secretion of powder wax at those places of articulation; no ovisac is formed, the embryos being laid at caudal end of body under the parent; legs and antennæ reddish brown; when boiled in 10% KOH the bodies of the adults turn deep blue-black and colour the KOH a blood-red.

The *males* have not been observed.

Locality.—Columbia, Mo.

Habits.—It takes the young about fifteen minutes after birth to free themselves from the thin, membraneous egg-shell which envelopes them. They have no powdery secretion when they first emerge from the pellicles. The young larvæ have the habit of congregating in masses when not attended by their common "shepherds," the little black ant (unidentified). In their natural

habitat, under the shaggy bark of the shell-bark hickory (*Hickoria ovata*), the ants do not allow them to remain any great length of time where they are born, but are transferred by them to the terminal or lateral twigs of hickory shoots at the base of the tree, or are transferred to similar situations on the old tree itself, where the bark is tender, such as occurs at the junctures of the leaf petioles with the twigs or at any abrasion or crevice in the bark, and here they are guarded and attended by a few of the ants which watch with all the dexterity and aggressiveness they possess. Here they remain until fall, feeding on the sap, and are "herded" by the ants when cold weather sets in, probably being taken into their nests where they hibernate, or possibly some few crawl under the bark and into crevices of the older bark where they pass the winter in these locations. In early spring, as soon as warm weather comes to stay, the larvæ are transferred by the ants to the tree, under the hard protecting bark, where they commence feeding and growing. They apparently become full-grown and mature by about the middle of July in this latitude, for adult females were examined on the 12th July and they were full of embryos. The first larvæ were observed on the 28th July, and they continue to lay eggs up to the middle of September (1915) and probably even later.

This is the largest *Pseudococcus* of which the writer knows, and its size and host plant are enough for ready identification. This scale insect is invariably attended by certain common black ants and the Coccidæ are generally in groups of two or three, but sometimes as many as ten are grouped under a slab of bark only six inches in diameter. This gregariousness in habit probably occurs because the ants can collect an abundance of "honey-dew" from the colony without any great difficulty, thus saving time and energy on the part of the ants. As many as fifty ants have been observed encircling one female adult, and as many more were crowding around to get their meal of secreted fluid. When disturbed by the removal of the bark, the ants would run around frantically with the tips of their abdomens elevated and their mandibles extended, making a most formidable appearance. The Coccids are generally located between the bark and wood where

there is just enough room for them to expand to their maximum development, and where the ants have easy access to the food-supply of secreted liquid. The writer has, however, occasionally found an isolated female scale which had been protected from external agents by the ants building up walls of frassy material from the wood of the tree to the shaggy flake of bark which had weathered away from the Coccid, thus exposing it to the attacks of predacious or parasitic insects until such a protection had been built by the ants. Through this wall of protective material were several entries or exits, as the case might be, for the ants to go to their "cows."

Natural Enemies.—While collecting this scale insect, the writer has found several Syrphid spp. larvæ in close conjunction with the sides of the scales, apparently feeding on their bodies. Insects thus attacked were partially shrivelled, but still alive and attended by the ants as usual. In a few cases the Syrphid larvæ were completely covered by the adult scale, probably having wormed their ways beneath the insects. It would appear that the ants tolerate this intruder, but for what reason, the writer cannot definitely say, unless it is because the Syrphid larvæ also give off a sweetened secretion, or because the ants have not learned to distinguish between the scale and the fly larvæ, or because the intruder does not entirely destroy the secreting faculties of this coccid. Most of the Syrphid larvæ are apparently of one species, being salmon pink in colour, and about 3 mm. long and 1 mm. wide at time of observation (14 Aug., 1916). However, a large, flattish circular or slightly elongate creamy-white Syrphid larva, 4 mm. long and 3 mm. wide was also taken in connection with the scales, but none have matured to render identification possible. No parasitic Hymenoptera have been reared from this Coccid.

Remarks.—A smaller, differently coloured mealy-bug, possibly very close to this species is mentioned from the same host in Indiana, but is not fully described, nor is it named by the State Entomologist of Indiana in his 1910 report, p. 226.

THE NYMPHS OF THE NORTH AMERICAN SPECIES OF
LEUCORRHINIA.

BY E. M. WALKER, TORONTO.

Through the kindness of Mr. F. C. Whitehouse, of Red Deer, Alta., who has been actively collecting and studying the Odonate fauna of this locality during the past two years, I have recently obtained nymph exuviae of *Leucorrhinia borealis* Hagen and *L. proxima* Calvert, the only two North American species of this genus, whose nymphs have not yet been described. Recently-emerged imagines of both species, as well as of *L. hudsonica* were found by Mr. Whitehouse, accompanied by their exuviae, so that in addition to the finding of the two new nymphs he has been able to furnish the information necessary to prove that the nymph described by me as that of *hudsonica** was correctly referred to this species.

The nymphs of *Leucorrhinia* may be characterized as follows:—Head somewhat less than twice as broad as long, eyes most prominent behind the middle, lateral margins very oblique, curving into the posterior margin without any indication of an angle. Mentum of labium about as broad as long, mental setae usually 13-15, inner margins of lateral lobes with very low crenulations, the marginal spinules in groups of two or three, of which one is much the longest, sometimes single; movable hood slender, scarcely half as long as the free margin of the lateral lobe; lateral setae 10 or 11. Abdomen ovate in outline, broader than the head, broadest at segment 6, tapering almost equally cephalad and caudad; lateral spines present only on segments 8 and 9, those on 9 not extending beyond apices of abdominal appendages; dorsal hooks present or absent, but never on segment 9; superior appendage triangular, acuminate, distinctly longer than broad, but little shorter than the inferior appendages; lateral appendages about half as long as the inferiors.

I have been able to find no good characters for the separation of nymphs of *Leucorrhinia* and *Sympetrum*. Generally speaking, the superior abdominal appendage is somewhat more elongate and acuminate in *Leucorrhinia*, being considerably longer than the basal breadth and not much shorter than the inferior appendages.

* Can. Ent., 1914, vol. XLVI, p. 375, pl. XXV, figs. 9-12.

In *Sympetrum* it is usually but little longer than broad, and falls considerably short of the inferior appendages even when the appendages are closed together. The head in *Sympetrum* is relatively somewhat larger, as a rule, than in *Leucorrhinia*.

Leucorrhinia hudsonica and *L. borealis* are distinguishable from all the known nymphs of *Sympetrum* except *S. rubicundulum*, *S. illotum* and *S. corruptum* by the absence of dorsal hooks on segs. 7 and 8. They are readily separated from these by the much larger lateral spines and the conspicuously striped venter of the abdomen. The other species of *Leucorrhinia* are distinguished from *Sympetrum* by the presence of a small dorsal hook on seg. 3, which, however, is very minute in *L. proxima*.

In offering the following key I am well aware that it may prove unsatisfactory in certain respects. The nymphs of *Leucorrhinia* and *Sympetrum* are variable in the very characters which are most useful in separating them. Those of *L. intacta*, *glacialis* and *proxima* are extremely similar and as I have had only a single exuvia of *glacialis* and but two of *proxima* it is quite uncertain whether or not the characters given will prove to be constant when more material is available for study.

KEY TO THE NYMPHS OF THE NORTH AMERICAN SPECIES OF
LEUCORRHINIA.

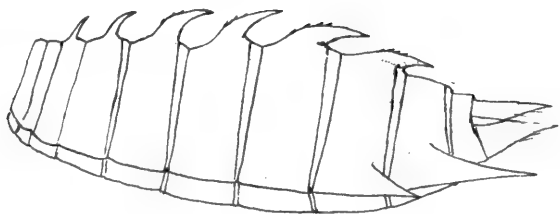
- A. Dorsal hooks present on abd. segs. 2-8, venter of abdomen without longitudinal dark bands.
- B. Eyes very prominent; lateral spines of seg. 9 extending back nearly or quite as far as tips of inferior appendages.....*frigida* Hag.
- BB. Eyes less prominent, lateral spines of seg. 9 not extending back as far as tips of inferior appendages.
- C. Dorsal hook of seg. 7 as long as mid-dorsal length of the segment, that of seg. 8 projecting well over the base of seg. 9; lateral spines of seg. 8 more or less divergent, their outer margins not continuing the regular curve of the abdominal margin; lateral spines of seg. 9 extending beyond tips of lateral appendages.
- D. Spinules on inner margin of lateral lobes of labium mostly in groups of 3; lateral setæ 10; dorsal hook

- of seg. 8 not declined, directed straight caudad at apex.....*intacta* Hag.
- DD. Spinules on inner margin of lateral lobes of labium mostly single; lateral setæ 11; dorsal of seg. 8 generally somewhat declined, the tip sometimes resting on dorsum of seg 9*.....*glacialis* Hag.
- CC. Dorsal hook of seg. 7 shorter than the mid-dorsal length of the segment, that of seg. 8 projecting barely over the base of seg. 9, lateral spines of seg. 8 slightly convergent, their outer margins continuing the general curve of the abdominal margin; lateral spines of seg. 9 not reaching beyond tips of lateral appendages.....*proxima* Calvert.
- AA. Abdominal segs. 7 and 8 without dorsal hooks, venter of abdomen with 3 conspicuous longitudinal dark bands (rarely inconspicuous).
- E. Length less than 18 mm.; lateral spines of seg. 8 two-fifths to one-half as long as the lateral margin of the segment (not including spine); dorsal hooks absent or vestigial ones present on some of the segments.....*hudsonica* Selys.
- EE. Length more than 18 mm.; lateral spines of seg. 8 one-sixth to one-fourth as long as the lateral margin of the segment; dorsal hooks absent.....*borealis* Hag.

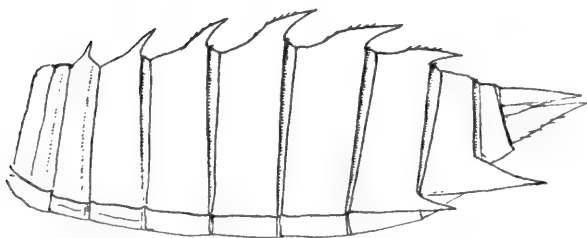
***Leucorrhinia borealis* Hagen.**

Nymph.—Eyes less prominent than in the other North American species of *Leucorrhinia*, the width of the head across the eyes being somewhat less than twice the length (not including labium); postero-lateral surfaces broadly rounded with numerous coarse hairs. Mentum of labium of the usual size and form, being subtriangular, nearly as broad as long; the median lobe rather bluntly obtusangulate; lateral lobes with inner margins feebly and broadly crenated, the marginal spines short, single, or with a second vestigial spinule; posterior margin with a few short scattered spinules or almost devoid of these; mental setæ 13, occasionally 14, the third

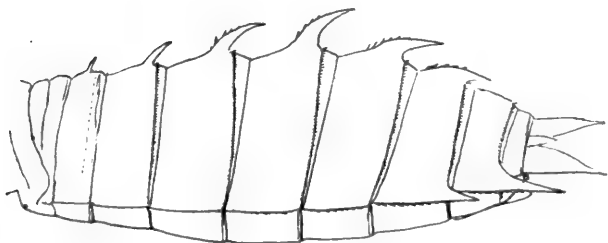
*Vide Needham, Bull, 47, N. Y. State Mus., p. 519, 1901.



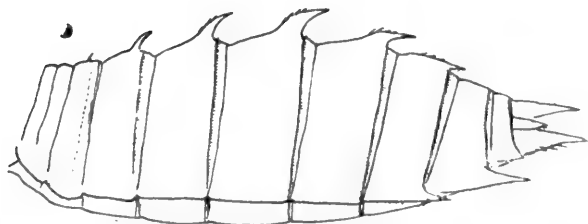
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NYMPHS OF LEUCORRHINIA.

to sixth from the outside longest; lateral setæ 11, sometimes 10. Abdomen somewhat elongate ovate, broadest at seg. 6, or at apical margin of seg. 5, tapering almost equally proximad and distad, its lateral margins forming an almost regular arc, fringed with spinules distally, especially on segments 8 and 9. Dorsal hooks wholly

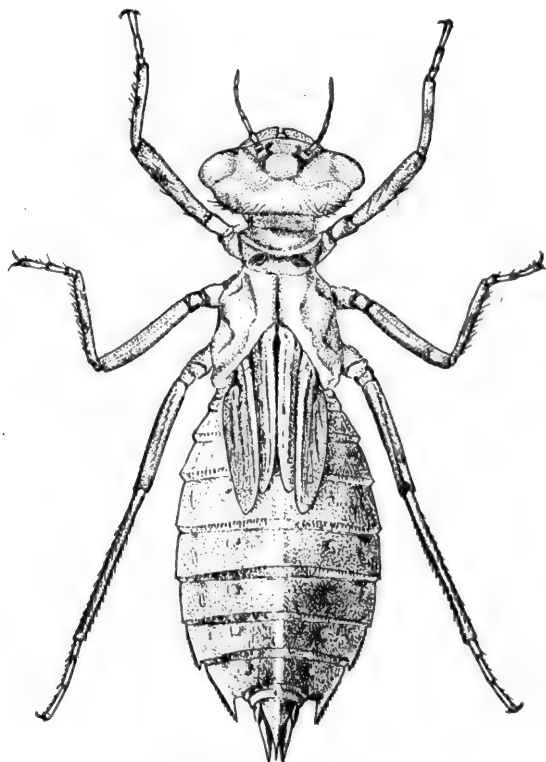
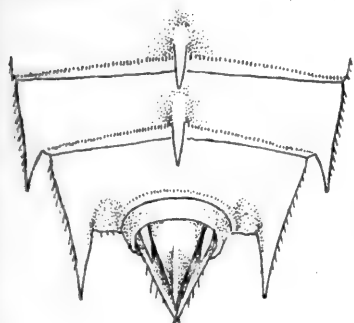
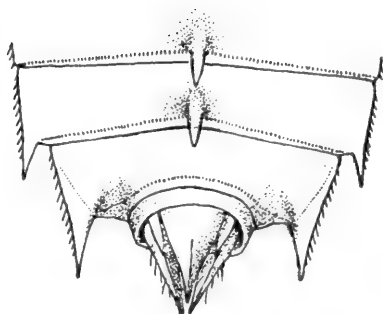


Fig. 20.—*Leucorrhinia borealis*, Hag., nymph.

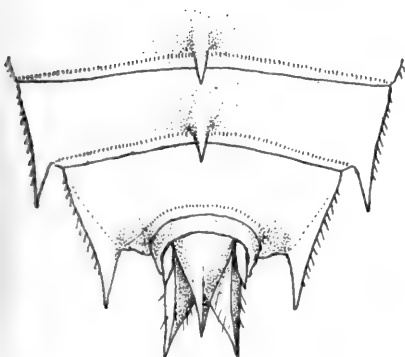
absent. Lateral spines of seg. 8 about one-seventh to one-fourth as long as the lateral margins of the same segment (not including the spine) their inner margins nearly parallel; those of seg. 9 about two-fifths the length of the lateral margin of the segment, not reaching apices of lateral appendages, their inner margins slightly convergent. Superior appendage triangular, keeled and somewhat



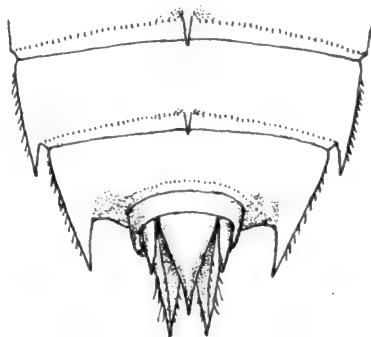
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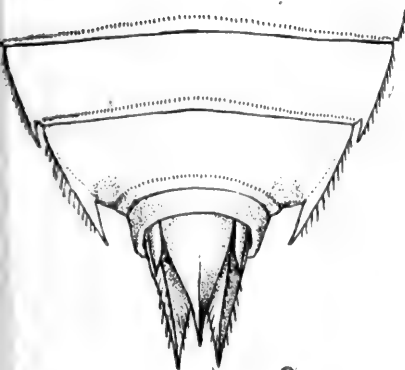
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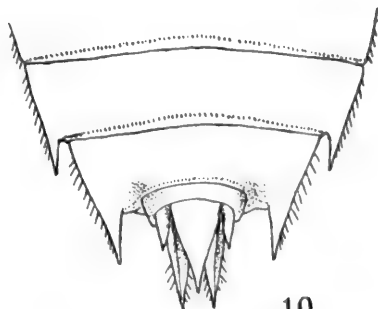
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10

spinulose on distal half above, about twice as long as lateral appendages and reaching back nearly to tips of inferior appendage; basal breadth about three-quarters of the length.

Colour pattern (exuvia)—Dull brownish more or less distinctly marked with paler yellowish. Head dark, sometimes streaked with pale yellowish behind and beneath the eyes; thorax obscurely mottled; wing-pads with more or less distinct pale costal streaks; legs pale with darker annuli as follows: femora with sub-basal, anteapical and apical, tibiae with basal, median and apical annuli, tarsal joints darkened distally. These markings are often largely obscure, the anteapical femoral rings being the most distinct and constant. Abdomen dark above with a median line, a pair of dorso-lateral spots and the postero-lateral angles on most of the segments pale.

Venter pale with three longitudinal dark bands, which may be somewhat obscure but are generally heavy and conspicuous. They are usually narrower but sometimes broader than the intervening pale areas.

Length of body 19.0–21.5 mm.; outer wing-pad 6.0–6.5 mm.; hind femora 5.0–5.8 mm.; width of head 5.25–5.6 mm.; width of abdomen 6.7–7.3 mm.

This nymph closely resembles that of *L. hudsonica*, particularly in the absence of dorsal hooks and the conspicuously striped venter of the abdomen. It is, however, easily distinguished from *hudsonica* by its larger size and the shorter lateral spines on segments 8 and 9.

***Leucorrhinia proxima* Calvert.**

Nymph.—Exuvia similar to that of *L. intacta*, slightly larger. Head a trifle longer and the eyes a shade more prominent. Width of head across the eyes about twice the length (not including labium) postero-lateral surfaces broadly rounded with numerous bristles. Labium of the usual form, the mentum quite similar to that of *intacta*, slightly longer than broad, middle lobe bluntly obtusangulate. Inner margins of lateral lobes with the usual broad, low crenulations, which are minutely, secondarily crenulate, the spines mostly in groups of two, of which one is much shorter than the other, a few single. Movable hook slender, nearly half as

long as inner margin of lobe. Mental setæ 11–15 (one specimen has 11 and 14, the other 13 and 15) of which the outer fourth to sixth is the longest. Lateral setæ 11 (10 on one side of one specimen). Abdomen ovate, broadest at seg. 6, tapering almost equally roxi mad and distad, the lateral margins almost regularly arcuate, fringed with spinules which become gradually stronger caudad. Lateral spines of seg. 8 about two-fifths as long as the margin of the segment, their outer edges continuing the regular curve of the abdominal margin, their general direction slightly convergent; those of seg. 9 about three-fifths as long as the margin of the segment, extending back to the apices of the lateral appendages, their outer margins straight and about in line with those of the segment, their general direction somewhat convergent. Superior appendage keeled above in the distal half, basal breadth about three-fourths the length, apex slender, slightly acuminate, sharp-pointed; lateral appendages about half as long as the superior; inferior appendages slightly surpassing the superior, with 4 or 5 spinules on their outer margins.

Colour pattern.—The two exuviae show nothing distinctive in coloration. They are pale with darker mottlings as in *glacialis* and *intacta*. Femora with sub-basal and anteapical annuli and darkened at apices, tibiae with basal and median annuli, also darkened at apices. Abdominal segments with a row of pale spots on each side, nearly midway between the middle line and the lateral margins. These spots are surrounded by darker cloudings and behind each is a dark spot. They are obsolescent in front of seg. 6. Laterad of these are irregular dark annuli with pale centres, and at the lateral margins of most of the segments the darker colour occupies the anterior half of the segment. Lateral spines pale, tipped with dark brown.

Length of body 19–20 mm.; outer wing-pad 6 mm.; hind femora 5.8–6.0 mm.; width of head 5 mm.; width of abdomen 7 mm.

EXPLANATION OF PLATES XII AND XIII.

Plate XII—Nymphs of *Leucorrhinia*, left lateral views of abdomen.

Fig. 1.—*L. frigida*.

Fig. 3.—*L. glacialis*.

Fig. 2.—*L. intacta*.

Fig. 4.—*L. proxima*.

Plate XIII—Nymphs of *Leucorrhinia*, terminal segments of abdomen, dorsal view.

Fig 5.—*L. frigida*.

Fig. 6.—*L. intacta*.

Fig. 7.—*L. glacialis*.

Fig. 8.—*L. proxima*.

Fig. 9.—*L. borealis*.

Fig. 10.—*L. hudsonica*.

NEW SPECIES OF NEW ENGLAND SARCOPHAGIDÆ.*

BY R. R. PARKER, BOZENMAN, MONT.

(Continued from page 364.)

Sarcophaga scoparia nearctica, n. subsp.

Type.—Massachusetts Agricultural College, male and female.

Paratypes.—Collection of author, two males, one female.

♂.—Posterior trochanter without "brush," with long hairs only; femur usually arched, posterior face without ventral row of

bristles; tibia more or less curved, with an anterior and a posterior beard, latter much the stronger; middle coxa, at least dorsally, with more than a single row of bristles; tibia on about distal half with short, weak, anterior and posterior beards; ventral surface of anterior coxa clothed completely with bristles; anterior postsutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; vestiture of third ventral plate erect and not short; both genital segments usually dull orange but first may be in part or wholly grayish pollinose; first segment in profile with a slight

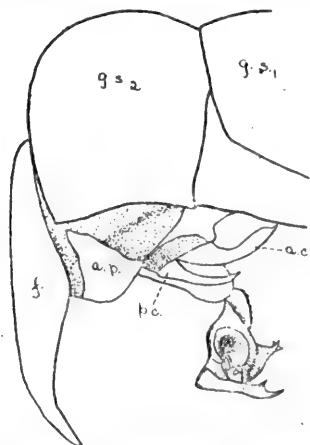


Fig. 21.—*Sarcophaga scoparia nearctica*, n. subsp., genital segments of male.

depression just anterior to marginal bristles, latter usually weak and often hair-like.

♀.—Vestiture of metanotum of short, reclinate bristles or of short nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout or at least anteriorly; anterior post-

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.

December, 1916

sutural dorsocentrals weak but at least as long as those before the suture, only last two pairs strong; nota of abdomen clothed with short, reclinate bristles above, beneath with more erect hairs or bristles; genital segments *protuberant*, somewhat cone-shaped, visible from above; the two broad lateral lips of the first genital segment dull orange, sometimes slightly darkened, spiracles close to anterior margins; fifth and sixth ventral plates fused; sixth fully exposed, not overlapped by lips of first segment, narrowed posteriorly, its posterior margin with bristles on each side of centre.

Length.—8.5 to 15 mm., average 12 to 14 mm.

♂.—HEAD.—Viewed from side, parafrontals and genæ with dark reflections. Breadth of front varies from slightly less to slightly greater than one-half eye width; cheek height approximately one-third or three-sevenths that of eye. Front prominent, sides of frontal vitta parallel or slightly convergent backward. Second antennal segment dark; third about twice length of second; arista plumose to beyond middle. Back of head somewhat convex, usually with four, sometimes three, irregular rows of black cilia behind eyes, otherwise clothed with whitish or yellowish hair that completely covers the metacephalon except that occasionally there are black hairs in lower anterior corners. Cheeks clothed with black hair. Gena with short row of long, sometimes bristly hairs near lower eye orbit, other shorter ones may continue upward. Palpi dark.

Chaetotaxy.—Lateral verticals absent, rarely weakly developed; vibrissæ inserted slightly above mouth margin.

THORAX.—Metanotum clothed with slender, reclinate bristles or with bristle-like hair. Hairs covering anterior spiracle dark brown basally, lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover dark brown or brownish, tips yellowish. Epaulets dark.

WINGS.—Bend of fourth vein either an acute, right, or slightly obtuse angle; anterior cross-vein more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section III of costa about one and one-half times section V or even longer; posterior margin of alulae either bare or fringed with hair; calypters whitish, fringe of hairs dark at fold, otherwise whitish.

LEGS.—Dark. Posterior trochanter without "brush;" femur

cylindrical or somewhat spindle shaped, often more or less arched, clothed beneath with long, fine hairs that become longer and coarser posteriorly, forming a sort of beard; anterior face with three rows of bristles, those of intermediate row shortest, and not developed distally; posterior face without ventral row of bristles; tibia more or less curved; anterior and posterior faces each with a beard of long, coarse, black hairs on about distal three-fourths, latter much the stronger: tarsus usually somewhat shorter than tibia, fourth segment at least one-half fifth. Middle coxa at least dorsally, with more than a single row of bristles, though the additional bristles may be rather slender: femur clothed beneath on posterior proximal half or more with long hairs; anterior ventral row of short, scattered bristles complete, posterior row represented only by "comb" extending proximally to the long hair: submesotibial bristle present, often obscured by coarse vestiture that covers tibia ventrally on distal half or thereabouts and becomes beard-like anteriorly and posteriorly. Ventral surface of anterior coxa clothed completely with bristles which are often separable into three irregular rows, one at each side and one intermediate that is usually less complete: vestiture of tibia longest ventrally, posteriorly and distally.

Chaetotaxy.—Anterior dorsocentrals short and usually stout but longer than vestiture of præscutum; acrostichals absent or but slightly differentiated anteriorly; inner presuturals short and slender: last two pairs of postsutural dorsocentrals strong, anterior to these several weak pairs that vary greatly in length; prescutellar acrostichals present: scutellar apicals present: three sternopleurals lower sternopleura with a single row of bristles, otherwise clothed with long hairs which, in large specimens, become quite coarse.

ABDOMEN.—Somewhat conical or oval; clothed above with short, reclinate bristles, beneath with longer, more erect hair. Ventral plates, as a whole, with their sides converging posteriorly, their shape and size variable; vestiture decreasing in length posteriorly, that of third plate shortest and erect. Posterior margin at fourth notum, especially dorsally, may be dull orange.

Chaetotaxy.—Second segment without marginal bristles; third with two and usually with slender, decumbent ones between these

and laterals; fourth with a complete row ending ventrally in long hairs.

GENITAL SEGMENTS.—Prominent, usually the greater part of first exposed; ground colour dull orange or yellowish; first (g. s. 1) sometimes brownish, usually with pollen, sometimes partly grayish pollinose and occasionally entirely so except lateral posterior portions. First (g. s. 1), vestiture shorter than that of second, "humps" almost bare, in profile with a slight depression anterior to marginal bristles, latter rarely strong, usually hair-like or even so weak as to be scarcely distinguishable. Membrane joining first and second segments dorsally often blackish. Second (g. s. 2), rotund, not flattened, anal area rather small and not extending above middle of posterior surface. Forceps (♀) darkened, usually blackish, at least distally, hairy to beyond middle; base with upward flap-like extensions clothed with fine hair shorter than vestiture of second segment; tips of prongs spread and bent forward. (a. p.—accessory plate, a. c.—anterior claspers, p. c.—posterior claspers.)

GENITALIA.—Distinctive for North American species.

♀.—Females differ from males in the following important characters.

HEAD.—Breadth of front at narrowest part slightly less than eye width. Upper inner orbits of eyes diverging downward.

THORAX.—Vestiture of metanotum of short reclinate bristles or nearly erect bristly hair except that vestiture of scutellum is hairy and erect throughout, or at least anteriorly.

LEGS.—Posterior trochanter with slender apical bristle: femur somewhat spindle-shaped, not arched, bristles of intermediate row on anterior face restricted to proximal half and sometimes only a few present; posterior row with ventral row of long, well separated bristles on proximal half or slightly more. Anterior and posterior ventral rows of middle femur complete, but bristles weak and inconspicuous distally: submesotibial bristle very strong, sometimes a short bristle just above it.

Chaetotaxy.—Lower sternopleura with bristles only, or at most but a few long hairs anteriorly.

ABDOMEN.—Oval; vestiture short throughout, clothed above with reclinate bristles, beneath either with more erect hair or bristles.

GENITAL SEGMENTS.—Protuberant, visible from above. The two broad lateral lips of first genital segment distinctly separate dorsally; dull orange, sometimes slightly darkened, occasionally yellowish pollinose ventrally; upper edges fringed with hair and bristles, latter mostly above lines of spiracles which are close to anterior margin. Spiracles of fifth segment usually concealed. Sixth ventral plate (seventh anatomical) with posterior marginal bristles at each side of centre and not overlapped by lips of first genital notum.

Described from 3 male and 2 female specimens, many others examined.

RANGE.—New England: Mass.: Woods Hole, Boston, Lowell, Cohasset, Gloucester, Cambridge, New Bedford, Wellesley, Melrose, Chester, Amherst; Me.: E. Eddington, Orr's Island, Buckfield; Conn.: New Haven.

United States.—N. Y., N. H., Pa., Ohio, Ill., Wy.

Böttcher (1912) has shown that *S. scoparia* Pandelle should more properly be called *Sarcophaga matertera* Rondani. *S. scoparia nearctica* is one of the most variable flies of this group with which we have to deal in New England; the description gives ample evidence. The characters of the penis are as much so as the external characters. In the figure of the genitalia a lateral distal process may be noted ending anteriorly in two sharp projections. Sometimes the lower projection is lacking while in other specimens the two processes are united anteriorly, forming a sort of distal ring.

Among my material are one female and two male specimens of the Palearctic species, *S. scoparia*. These differ considerably from the American subspecies. The genital segments and genitalia are black or blackish, the bristles of the thorax are longer and more slender, and its vestiture more hairy. Some of our specimens approach the European as regards chaetotaxy and vestiture, but I have seen none with any tendency toward black genital segments, though the first is sometimes brownish. It is possible that our North American subspecies might justifiably be designated as a species.

The females of *S. scoparia nearctica* are rather difficult to distinguish from those of *S. utilis* Aldrich.

Specimens of this subspecies captured by Metz larviposited on dung and refuse. A female received from Richardson (N. J.) was captured on cow manure.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

ANNUAL MEETING.

The fifty-third Annual Meeting of the Entomological Society of Ontario was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 2nd and 3rd, 1916. The President of the Society, Mr. A. F. Winn, Westmount, P. Q., occupied the chair. The following were present at the meeting: Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington, D. C.; Prof. P. J. Parrott, Geneva, N. Y.; Prof. E. M. Walker, University of Toronto; Prof. W. Lochhead, Macdonald College, P. Q.; Prof. W. H. Brittain, Truro, N. S.; Dr. C. Gordon Hewitt, Messrs. A. Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. W. H. Harrington and F. W. L. Sladen, Ottawa; Rev. Father Leopold, La Trappe, P. Q.; Mr. F. J. A. Morris, Peterborough; Mr. J. Dunlop, Woodstock; Prof. J. Dearness, London; Mr. W. A. Ross, Vineland Station; Mr. W. E. Biggar, Hamilton; Mr. N. Criddle, Treesbank, Man.; Mr. A. B. Baird, Fredericton, N. B.; Professors C. A. Zavitz, J. E. Howitt, C. J. S. Bethune, L. Caesar, J. W. Crow, D. H. Jones, E. J. Zavitz, and S. B. McCready, Dr. R. E. Stone, Capt. G. J. Spencer, Messrs. A. W. Baker, A. H. Tomlinson, G. H. Unwin, C. R. Klinck, H. R. Fry, G. F. Kingsmill, E. Hearle, A. W. Guild, R. M. Aiton, J. B. McCurry and W. Evans, Ontario Agricultural College.

Letters expressing regret at their inability to attend the meeting, and containing hearty good wishes for its success, were received from the Minister and Deputy Minister of Agriculture for Ontario, the Minister of Education, and a large number of the leading entomologists in the United States.

On Thursday morning a meeting of the Council was held, at which the report of the proceedings during the past year was

drawn up and various matters relating to the Society's welfare were discussed. A recommendation was made that Mr. John D. Evans, of Trenton, a past President of the Society and a most useful adherent for many years, should be elected a Life Member. This was subsequently done at the general meeting. It was decided that the next annual meeting be held at Macdonald College, Que. The President proposed that information regarding the principal collections of insects in Canada, both public and private, should be procured and published in the *Canadian Entomologist* from time to time.

In the afternoon the members met in the Entomological Lecture Room in the Biological Building, and the proceedings commenced with the presentation of the reports of the Council and the various officers and branches of the Society, followed by the reading of papers and the election of officers, a list of whom is given below.

The open meeting was held on Thursday evening in the auditorium of the Massey Hall, and the Society was particularly fortunate in having, as lecturer for the occasion, Dr. L. O. Howard, Chief of the Bureau of Entomology, U. S. Department of Agriculture. The subject of the lecture, "The Carriage of Diseases by Insects," is one with which Dr. Howard has been closely identified for many years, and was greatly enjoyed by the large audience, among which, besides the members of the Society, were many members of the staff and students of the College and of the Macdonald Institute. The lecture was copiously illustrated by many fine lantern slides.

The Society was welcomed to the College by Prof. Zavitz in the absence of President Creelman, and at the close of the lecture a hearty vote of thanks, proposed by Dr. Hewitt and seconded by Prof. Lochhead, was tendered to Dr. Howard for his interesting and instructive address, and for his kindness in coming so far to attend the meeting.

After the lecture the members were entertained at a smoker given in the students' parlour, Main Building, a students' vocal quartette contributing much to the enjoyment of those present. Mr. Eric Hearle, a graduate of the College, who recently returned from active service in France, gave an interesting account of the

problems arising from the prevalence of *Pediculi* and other insect vermin in the trenches, and the means taken to alleviate the terrible suffering caused by these pests.

The following papers were read at the morning and afternoon meetings:—

"The Naturalist in the City," by the Rev. Dr. T. W. Fyles; "Dusting Fruit-trees and Grapes for the Control of Biting Insects and Diseases," by Prof. L. Caesar; "General Notes on Aphids which occur on Apple-trees," by Mr. W. A. Ross; "Further Experiments with the Green Apple Bug," by Prof. W. H. Brittain; "Notes on *Physonota unipuncta*, the Sun-flower Tortoise-beetle," by Mr. A. F. Winn; "Preliminary Notes on the use of repellants for Horn-flies and Stable-flies on Cattle," by Mr. A. W. Baker; "The Wood of Desire," by Mr. F. J. A. Morris; "Insects as Material for Studies in Heredity," by Prof. W. Lochhead; "The Migratory Tendency in Dragonflies," by Prof. E. M. Walker; "The History of the Forest Tent-caterpillar and Fall Web-worm in North America," by Mr. A. B. Baird; "Three important Green-house Pests recently introduced into Canada," by Mr. A. Gibson; "Camp Hygiene," by Capt. G. J. Spencer; "Experiments in the Control of the Apple Maggot," by Prof. W. H. Brittain; "Summary of Experiments on the Control of Locusts by *Coccobacillus acridiorum* d'Herelle," by Messrs. E. M. Du Porte and J. Vanderleck; "Three Shade-tree Insects," by Mr. J. M. Swaine; "Notes on Some Insects of the Season," by L. Caesar; and "Parasites of the Larch Saw-fly," by Dr. C. Gordon Hewitt. These papers will be published in full in the forthcoming Annual Report of the Society.

The election of officers for the ensuing year resulted as follows:

President.—Mr. Albert F. Winn, Westmount, Que.

Vice-President.—Prof. Lawson Caesar, Dept. of Entomology, Ontario Agricultural College, Guelph.

Secretary-Treasurer.—Mr. A. W. Baker, B. S. A., Lecturer in Entomology, O. A. College, Guelph.

Curator.—Mr. W. Evans, O. A. College, Guelph.

Librarian.—Rev. Prof. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., Professor of Entomology and Zoology, O. A. College, Guelph.

Directors.—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Dept. of Agriculture, Ottawa; Division No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. F. J. A. Morris, Peterborough; Division No. 5, Mr. J. W. Noble, Essex, Ont.; Division No. 6, Mr. W. A. Ross, Vineland Station, Ont.

Delegate to the Royal Society of Canada.—Mr. F. J. A. Morris, Peterborough, Ont.

By kind permission of the College authorities the members were provided with lunch each day in the new Dining Hall; this proved a great saving of time, and also an agreeable opportunity for social intercourse.

DR. L. O. HOWARD.

To Dr. L. O. Howard, Chief of the Bureau of Entomology at Washington, we offer our hearty congratulations on his election to membership in the National Academy of Sciences of the United States. This is regarded as the highest honour that can be bestowed on any scientific man in North America. As stated by Mr. E. A. Schwarz in a recent issue of the Proceedings of the Entomological Society of Washington, this honour has been well earned by Dr. Howard. "He has done a good deal of meritorious work in systematic and bionomic entomology; he has published many important works on economic entomology, but above all, he is now, and has for many years been the efficient chief and leader of the Bureau of Entomology, and as such has acquired a world-wide and deserved reputation. Under the enlightened and liberal administration of Dr. Howard, the growth of the Bureau of Entomology has been really marvellous. It has become a model for the many similar, though much smaller, institutions that have been established of late years in many countries."

"Since the organization of the Academy the following entomologists have been elected members: Dr. John L. Leconte, Dr. A. S. Packard, Mr. Samuel H. Scudder, Prof. W. M. Wheeler in 1912, and now Dr. Howard." The three former are no longer living, and entomology is thus represented by the two latter only.

Index to Volume XLVIII.

- Abrostola parva*, n. sp., 225.
Acanthocinus obsoletus, 197.
Acephana, n. gen., 153.
Achrysocharelloidea albiscapus, n. sp., 336.
Achrysocharelloidea, occurrence in N. America of, 336.
 Acridiidae, some N. Georgia, 274.
Actornithophilus, n. gen., 303.
 " species of, 304.
Adalia bipunctata, 104.
Agallia sanguinolenta, 178.
Ageniella atrata, 370.
 " perfecta, 371.
 " rufigastra, 371.
Agrilus arcuatus, 386.
 " politus, 386.
Alabama argillacea, 35.
Alaus myops, 384.
 ALDRICH, J. M., article by, 20.
 ALEXANDER, C. P., articles by, 42, 316.
Algonquina, n. gen., 121.
 ALLARD, H. A., articles by, 274, 356.
Allegophylax, n. gen., 118.
Allomyia, n. gen., 120.
Allophylax, 120.
Anabolia, 119.
Anabolina, 119.
Andrena apacheorum, 253.
 " candidiformis, 254.
 " cyanura, n. sp., 252.
 " hirticincta surda, 253.
 " nigratarsis, 253.
 " pertarda, 253.
 " plumifera, n. sp., 393.
 " ricardonis, n. sp., 272.
Andrina radialis, new name, 19.
Anisogamus, 121.
Anodus dissimilis, n. sp., 93.
Anosia plexippus, 34, 106.
Anurogryllus muticus, 356.
Anthophora californica, 55.
 " urbana, 55.
 Ants in dwellings, control of, 365.
Apatania, 120.
Aphidencyrus inquisitor, 342.
Aphididae, found on apple in Britain, 169, 202, 233, 261.
Aphis avenae, susceptibility of eggs to hydrocyanic acid, 367.
Aphis crataegi, 170, 207, 209, 210.
 " kochii, 170, 202, 209, 211, 262.
 " nigra, n. nom., 171, 209, 233.
 " oxyacanthae, see *A. nigra*.
 " pomi, 170, 173, 209, 211.
Aphis pomi, susceptibility of eggs to hydrocyanic acid, 367.
Aphis pomonella, n. sp., 172, 262.
 " rumicis, 171, 234.
Aphonus tridentata, 387.
Aphrophora parallela, 143.
Apolopsycha, n. gen., 121.
 Apple maggot parasite, 168.
 April mud puddle, inhabitants of, 214.
Apterolalaps nigriscutum, n. gen. et sp., 264.
Arachnida from sunflowers, 78.
Arctiidae, in Heath Collection, 227.
Arctæcia, 118.
 Army worm, 34.
Arphia sulphurea, 279.
 " xanthoptera, 279.
Asaphes americana, 267, 342.
Aspidiotus ulmi, 143.
Astenophylax, 118.
Asymplesiella india, n. sp., 341.
Austrophorocera, n. gen., 157.
Austrophryno, n. gen., 160.
Autochelostoma canadensis, n. gen. et sp., 270.
Badister pulchellus, 382.
 BAKER, A. C., article by, 280.
 BAKER, A. W., article by, 300.
 BALL, E. D., article by, 124.
 BANKS, NATHAN, article by, 117.
Baoanusia africana, n. sp., 114.
 BARNES, W., and MCDUNNOUGH, J., articles by, 144, 290.
Barrovia, n. sp., 290.
Baryodma ontarionis, n. sp., 71.
Basilarchia arthemis rubrofasciata, n. subsp., 221.
Batazonus coquilletti, 372.
 Bedbug, eradication of, 74.
 Bees from sunflowers, 76.
 Bees from Madagascar, 406.
 Bees in the British Museum, some, 272.
 Bees of Canada, 269, 312.
 Bees of the Coronado Islands, 54.
 Bees, Rocky Mountain Andrenid, 252.
Bellamira scalaris, 297.
 BETHUNE, C. J. S., articles by, 1, 216, 395, 430.
 BEUTENMULLER, WM., article by, 372.
Biosteres ragoletis, 168.
 BIRD, HENRY, article by, 13.
 BLATCHLEY, W. S., articles by, 10, 91.
Blethisa quadricollis, 382.

BOOK REVIEWS:

- BLATCHLEY & LENG's Rhyncho-
phora of North-eastern America,
395.
Contributions to Canadian Bi-
ology, Fasc. II—Fresh-water Fish
and Lake Biology, 216.
NEEDHAM & LLOYD's Life of In-
land Waters, 291.
NELSON's Embryology of the
Honey Bee, 106.
Brachyacantha floridensis, n. sp., 93.
BRAUN, ANNETTE F., article by, 138.
Brenthis aphirape dawsoni, n. subsp.,
222.
Brenthis chariclea grandis, n. subsp.,
223.
British Columbia, a new species of
Platypus, from, 97.
BRITTAIN, W. H., and GOODERHAM, C.
B., article by, 39.
Bruchophagus borealis, 338.
BRUES, C. T., article by, 394.
Bucculatrix crescentella, n. sp., 140.
Butterflies of Heath Collection, 164.
Butterfly, the Five Thousand Dollar,
109.
Caddice-flies, classification of Limne-
philid, 117.
CAESAR, L., article by, 397.
California, sunflower insects in, 76.
California Privet, aphids on, 215.
Calloides nobilis, 388.
Callopietria floridensis, 141.
Camponotus pennsylvanicus, 365.
Cardepia mutata, 68.
CASEY, THOS. L., article by, 70.
Catocala julietta, n. sp., 72.
Catolaccus perdubius, n. sp., 114.
Cecidomyia resinicola, 143.
Cephalosmia, n. gen., 270.
Ceropales foxii, n. sp., 369.
" *minima*, 369.
" *robinsonii*, 369.
Chalcid flies, new species of, 100, 113,
242, 246, 263, 265, 336, 337, 408,
409, 410.
Chilostigma, 120, 121.
Chlorodexia, n. gen., 154.
" *froggattii*, n. sp., 154.
Chlorosmia, n. gen., 270.
Chorizagrotis terrealis, 27.
Chorthippus curtipennis, 221.
Chortophaga viridifasciata, 277.
Chrysobothris blanchardi, 386.
Chrysomela multipunctata bigsbyana,
147.
Chrysomela philadelphia, 147.
" *scalaris*, 149.
Chrysops, Newfoundland species of
220.
Chrysotimus, delicatus, 23.
" *flavicornis*, n. sp., 24.
" notes on, 23.
Cicindela formosa generosa, 381.
" *purpurea limbalis*, 381.
Clemson College, notes from, 34.
Clistoronia, n. gen., 119.
Coccinella 9-notata, 90.
COCKERELL, T. D. A., articles by, 54,
76, 123, 252, 272, 391, 406.
Calopisthia confusa, n. sp., 246.
Cœlopisthoidea, see *Dibrachys*.
Coleoptera, from an April mud puddle,
214.
Coleoptera, notes on Maine, 381.
Colias philodice, heliotropism in, 6.
Collops tricolor, 387.
Colorado, two species of *Rhamphomyia*
from, 123.
Colpodia fletcheri, n. sp., 400.
Colpotauius, 119.
Copablepharon viridisparsa, n. sp., 60.
Coptodisca maganella, n. sp., 138.
" *ostryæfoliella*, 139.
Corymbites fallax, 385.
" *vernalis*, 385.
Corythuca arcuata, 143.
COSENS, A., article by, 105.
Craneflies, new nearctic, 42.
Cremastogaster lineolata, 366.
CRIDDLE, N., GIBSON A., and, article
by, 133.
Crocisa subcontinua, 407.
CROFT, PROF. H. H., (Pl. I), 1.
Cryptorhopalum hæmorrhoidale, 383.
Cucullia asteroides, 58, 68.
" *indicata*, 68.
" *montanae*, 68.
" *omissa*, n. sp., 58, 68.
" *postera*, 68.
" *similaris*, 68.
Dasyneura gossypii, n. sp., 29.
" *sassafras*, n. sp., 29.
DEARNESS, JOHN, article by, 106.
Decatomidea cooki, 337.
Deilinia perpallidaria, 27.
Dennyus distinctus, n. sp., 310.
" n. gen, 309.

- Depressaria heracliana*, 37.
Desmocerus palliatus, 201, 297.
Desmoris constrictus, 78.
Diastictis andersoni, n. sp., 251.
Diaulinus intermedius, n. sp., 265.
Dibrachys, key to N. American species of, 408.
Dicosmœcus, 120.
Dicranomyia aquita, 79.
 " *macateei*, n. sp., 42.
Diedrocephala coccinea, 178.
Diglyphus maculipennis, 115.
Dinocampus americanus, 89.
Diptera, two new Canadian, 20.
Dissosteira carolina, 277.
DOD, F. H. WOLLEY, articles by, 58, 161, 226, 367, 375.
Dominion Entomologist, report of the, 104.
Donacia, species from Maine, 390.
DOW, R. P., articles by, 110, 329.
Dragonflies, a curious trap for, 314.
 " from Newfoundland, 220, 257.
Drusus, 121.

Ecclisomyia, 121.
Editor's Office Chair, from the, 329.
Elaphrus cicatricosus, 382.
 " *clairvillei*, 381.
 " *olivaceus*, 382.
Elophila avernalis, 28.
Emplœcia inconstans, 27.
Empoasca mali, 178.
Enallagma calverti, 192.
 " *cyathigerum*, nymph of (Pl. IX), 192.
Encyrtus chionaspidis, 113.
Entomological Notes, 179.
Entomological Society of Ontario, 300.
Entomological Society of Ontario, Annual Meeting, 427.
Entomology, general works on, 332.
Episyron griseus, 371.
Eriosoma lanigera, 172.
Eritettix carinatus, 276.
Euderomphale fuscipennis, n. gen. et sp., 410.
Eupelmus charitopoides, n. sp., 244.
 " *cyaniceps amicus*, n. var., 244.
Eupelmus cyaniceps ulahensis, n. var., 244.
Eupelmus marylandicus, n. sp., 242.
 " *speciosus*, n. sp., 243.
Euphoria fulgida, 388.

Eupithecia sp., from sunflowers, 78.
Euplectrus, key to N. American species of, 265.
Eupogonius subarmatus, 296, 298.
Eupsalis minuta, 390.
Eurygastropsis, n. gen., 158.
Eurytoma binotata, 339.
 " *galeati*, n. sp., 245.
 " *minnesota*, n. sp., 338.
 " *pachyneuron*, n. sp., 337.
Eurytomocharis eragrostidis, 338.
 " *minuta*, 337.
 " *trioidii*, 338.
Eustenace, n. gen., 118.
Eutettix columbiana, n. sp., 125.
 " *coloradensis visalia*, n. var., 128.
Eutettix insana coronata, n. var., 127.
 " *nevada*, n. sp., 126.
 " *rubida*, n. sp., 126.
Euxoa thanatologia, 61, 69.
 " " var. *borethra*, 62, 69.
Euxoa thanatologia, var. *perfida*, n. var., 64, 69.
Euxoa thanatologia, var. *sordida*, 63, 69.
Euxoa verticalis, 27.
Exorista caesar, n. sp., 20.

FELT, E. P., articles by, 29, 400.
FERRIS, G. F., article by, 301.
Florida Fern-cutworm, 141.
Formicapis clypeata, n. gen. et sp., 271.
FRENCH, G. H., article by, 72.
Froggattimyia hirta, n. gen. et sp., 156.
Frontina spectabilis, n. sp., 21.
FROST, C. A., articles by, 214, 381.
FYLES, T. W., article by, 106.

Gaea arizonensis, n. sp., 372.
Gall midges, new, 29.
 " " new Indian, 400.
Geometridæ, new species and varieties of, 249, 326, 349.
Geometridæ, types of, in Snow Collection, 27.
Georyssus pusillus, 384.
Gerotachina, n. gen., 152.
GIBSON, ARTHUR, articles by, 79, 213, 365, 373.
GIBSON, ARTHUR, and CRIDDLE, N., article by, 133.

- GIBSON, E. H., article by, 177.
 GIRAULT, A. A., articles by, 100, 113, 149, 242, 246, 263, 265, 336, 337, 408, 409, 410.
 Glyphopsyche, 120.
 Glyphotælius, 118.
Gonatocerus partifuscipennis, n. sp., 102.
Gonomyia æqualis, n. sp., 323.
 californica, n. sp., 324.
 filicauda, n. sp., 320.
 flavibasis, n. sp., 317.
 florens, n. sp., 316.
 mexicana, n. sp., 321.
 new N. American species of, 316.
Gonomyia noveboracensis, n. sp., 319.
 GOOD, C. A., article by, 168.
 GOODERHAM, C. H., BRITAIN, W. H. and, article by, 39.
 Grammotaulius, 119.
 Grasshoppers from Newfoundland, 221.
- Habrolepoidea depressa*, n. sp., 343.
 tarsalis, n. sp., 344.
Hadena burgessi, 26.
Halesechila, 120, 121.
Halictus catalinensis, 55.
 coronadensis, n. sp., 56.
 cyaneicaps, n. sp., 254.
 daggetti, n. sp., 57.
 grinnelli, n. sp., 56.
 helianthi, n. sp., 77.
 nevadensis, 58.
Haltica bimarginata, 390.
Haltica vaccinia, n. sp., 95.
Halticus citri, 35.
Harpomyia indica, n. gen. et sp., 401.
Heleonomus confusus, n. sp., 307.
 n. gen., 305.
 species of, 306.
 Heliotropism in butterflies, 6.
Hemichionaspis aspidistræ, 142.
Hemileuca lucina latifascia, n. subsp., 224.
 Hemiptera from sunflowers, 78.
Hepialus thule, 105.
Hesperophylax, n. gen., 118.
 HEWITT, C. GORDON, articles by, 37, 106, 179, 196.
Hippiscus rugosus, 277.
Hippodamia convergens, 89.
 HOLLINGER, A. H., articles by, 144, 411.
 Homophylax, 120.
 HOOD, J. D., article by, 130.
- Hoplosia nubila*, 199, 389.
Hydriomena californiata niveifascia, ab. n. 249.
 Hydrocyanic gas, susceptibility of aphid eggs to, 367.
Hylepsyche, n. gen., 121.
 Hymenoptera from sunflowers, 76.
Hyperitis indiscretata, 27.
Hypnoidus, species from Maine, 387.
Hyssopus, n. gen., 115.
 thymus, n. sp., 115.
- Indodiplosis mangiferæ*, n. gen. et sp., 403.
 Ipidæ, new species of, 181.
Ips chagnoni, n. sp., 186.
 confluentus, 384.
 vancouveri, n. sp., 188.
 Ironoquia, 121.
Ischnopsyllus insignis, 106.
Isosoma orchidearum, 142.
- Jassoidea, in Central Mississippi Valley 177.
Junonia cænia nigrosuffusa, n. subsp., 222.
- KNIGHT, H. H., article by, 345.
- Laphygma frugiperda*, 34.
Leperisinus californicus, n. sp., 190.
 Lepidoptera, Heath Collection of, 161, 226, 375.
 Lepidoptera, new N. American, 221.
 Lepidoptera, types of, in Snow Collection, 25.
 Leptophylax, 119.
Leptostylus macula, 200.
 sex-guttatus, 198.
Leptura biforis, 389.
 nigrella 389.
Leucobrephos brephoides, life-history of, 133.
Leucorrhinia, key to nymphs of N. American species of (Pls. XII, XIII) 415.
Leucorrhinia, nymphal characters of, 414.
Leucorrhinia borealis, nymph of, 416.
 proxima, nymph of, 420.

- Limnephilidae, classification of, 117.
 Limnephilus, 119.
 Limnichus punctatus, 384.
 Limnobia gracilis, 79.
 Limonius aurifer, 386.
 Lina interrupta, 146, 148.
 " scripta, 148.
 Listotrophus cingulatus, 383.
 Lycæna rita, n. sp., 223.
 Lychnosea helveolaria, 27.
 Lygus communis, n. sp., 346.
 " communis novascotiensis, n. var., 349.
 Lygus invitus, 345.
 Lyonetia candida, n. sp., 140.
- Macaria fieldi*, n. sp., 326.
 " *grossbecki*, n. sp., 327.
 " *minuta*, n. sp., 328.
 McDUNNOUGH, J., article by, 25.
 McDUNNOUGH, J., BARNES, W. and, articles by, 144, 290.
Mesembriomintho compressa, n. sp., 159.
Mesembriomintho, n. gen., 158.
 Mealy-bug, Shell-bark hickory, 411.
 Megachile piliceps, 407.
 Megachilidae of Canada, 269.
 Melanoplus, N. Georgia species of, 278.
 Melanotus leonardi, 385.
 Menoponidae, some generic groups in the, 301.
 Microdontomerus anthonomi, 341.
 Microlepidoptera, new species of, 138.
 Miogryllus saussurei, 356.
 Monohammus confusus, 388.
 " marmorator, 388.
 MORRIS, F. J. A., articles by, 145, 197, 293.
 Muscoidea, new Australian, 151.
 Mysidae, characters of, 307.
 " species of, 308.
- Necrophorus vespilloides, 383.
 NEEDHAM, J. C., and SMITH, LUCY W., article by, 80.
 Nemobius carolinus, 357.
 Neoclytus erythrocephalus, 197.
 " longipes, 197.
 Neoconocephalus robustus crepitans, 357.
 Neoderostenus, occurrence in N. America of, 409.
- Neoderostenus bipunctatus*, n. sp., 409.
Neomphaloidella ceroplastæ, n. sp., 100.
 " *nebraskensis*, n. sp., 103.
Neomphaloidella pulchrivertris, n. sp., 101.
 Neophylax, 120.
 Neotettix rotundifrons, 276.
 New Jersey, economic insects from, 141.
 New Jersey, insect fauna of, 255.
 " Japanese bug new to, 255.
 New Jersey, notes from, 35.
 Newfoundland, a few days in, 217.
 " Diptera from, 258.
 " dragonflies from, 220, 257.
 Newfoundland, Hymenoptera from, 259.
 Newfoundland, new Tortrix of economic importance from, 373.
 Niagara Glen, a visit to, 293.
 Nitidulini, a new genus and species of, 91.
 Noctuid genus, a new, 290.
 Noctuid notes from Western Canada, 58.
 Noctuidæ, in Heath Collection, 228, 375.
 Noctuidæ, types of, in Snow Collection, 26.
 Nomada custeriana, 273.
 " illinoensis, 273.
 " *vernonensis*, n. sp., 273.
 " *vicinalis aldrichi*, 273.
Nomenia obsoleta, n. sp., 249.
 Nomotettix compressus, 276.
 Notes and Queries, 34, 104, 141, 214, 255.
- Oberea pallida, 389.
 " tripunctata, 142.
- OBITUARY NOTICES:
 Cunningham, Thomas H., 180.
 Meade-Waldo, Geoffrey, 196.
 Pergande, Theodore, 213.
 Webster, F. M., 37.
 Williams, J. B., 248.
- Odontosphindus denticollis, 387.
 Oligophlebodes, 120.
 Omophron americanum, 381.
 Oncocemis major, 26.
Onthophagus nigrescens, n. sp., 94.
Opsophana, n. gen., 153.
Ormyrus unimaculatipennis, n. sp., 342.

- Orphulella pratorum*, 277.
Orthoptera from Clarendon, Va., 356.
Orthotomicus lasiocarpi, n. sp., 183.
 " *ornatus*, n. sp., 185.

Pachymelus grandieri, n. sp., 406.
 " *micrelephas*, 406.
Papaipema cerina, 14.
 " *circumlucens*, 16.
 " *nelita*, 13.
 " *nelita linda*, n. var., 14.
 " new life histories in, 13.
 " *nepheleptena*, 15.
Parabrachelia, n. gen., 159.
Paracalliphora, n. gen., 151.
 Parasite reared from same individual
 host, two generations of, 89.
Par eupogona, n. gen., 157.
 PARKER, R. R., articles by, 359, 422.
 Parsnips insect enemy of, 39.
 Parsnip webworm, life history of, 39.
Pavostelis, n. subg., 313.
Pelidnota punctata, 296.
Pelto perla ada, n. sp., 86.
 " *anna*, n. sp., 83.
 " *arcuata*, 88.
 " *brevis*, 88.
 " *cora*, n. sp., 86.
 " *cornelia*, n. sp., 84.
 " *dorothea*, n. sp., 84.
 " *maria*, n. sp., 82.
 " *thyra*, n. sp., 87.
Perdita aureovittata, n. sp., 391.
Petrophora, see *Xanthorhiza*.
Phenodiscus partifuscipennis, n. sp.,
 102.
Phalonia spartinana, n. sp., 144.
Phanurus emersoni, n. sp., 150.
 " *floridanus*, 149.
 " *opacus*, 149.
 " *ovivorus*, 150.
Phlepsius irroratus, 178.
 " *loculatus*, n. sp., 128.
 " *stellaris*, n. sp., 129.
Phora viridinota, n. sp., 394.
Phorodon humuli, 171, 261.
Phymaphora pulchella, 383.
Physocnenum brevilineum, 388.
Physothrips antennatus, 130.
 " *xanthocerus*, n. sp., 131.
Phytomyza chrysanthemi, 142.
Pirene marylandica, n. sp., 116.
Pityokteines elegans, n. sp., 182.
 " *jasperi*, n. sp., 181.
Plagioderma versicolora, 106.

Plagionotus speciosus, 389.
Platycentropus, 119.
Platybus wilsoni, n. sp., (Pls. VI, VII),
 97.
Pleurotropis longus, n. sp., 342.
Plum Curculio, nature of its injuries
 and means of control (Pl. XI), 397.
Pompiloides apicatus, 371.
 " *argenteus*, 372.
Popular and practical entomology, 6,
 37, 74, 109, 145, 197, 217, 257, 293,
 329, 365, 397.
Potamorites, 121.
Protomeigenia aurea, n. gen. et sp., 156.
Protomiltogramma cincta, n. sp., 155.
 " " n. gen., 154.
Psammocharidæ, notes on Provan-
 cher's species of, 369.
Pseudiglyphomyia coptodiscæ, n. sp.,
 266.
Pseudococcus jessica, n. sp., 411.
 " " habits of, 411.
 " " enemies of, 413.
Psychoronia, n. gen., 119.
Pterocomma beulahensis, 282.
 " *bicolor*, 284.
 " key to species of, 288.
 " *populea*, 280.
 " *populifoliae*, 280.
 " *salicis*, 283.
 " *steinheili*, 285.
Ptilinus ruficornis, 387.
Ptinus bicinctus, 387.
Pycnopsyche, 119.

Quadrifrons castaneus, n. gen. et sp., 92.

Rhadicoleptus, 118.
Rhamphomyia calvimontis, n. sp., 123.
 " *sepulta*, n. sp., 123.
Rhopalosiphum ligustri, 215.
Rhynchites elusus, n. sp., 96.
 " *perplexus*, n. sp., 95.
Rileyia americana, n. sp., 339.
 " *hegeli*, n. sp., 340.
 ROHWER, S. A., article by, 369.
 Ross, W. A., articles by, 74, 367.

Sabulodes imitata, 28.
Saperda vestita, 198.

Sarcophaga bullata, n. sp., 359.
scoparia nearctica, n. subsp.
 422.

Schistocerca alutacea, 277.

" *americana*, 277.

" *damnifica*, 278.

Scotogramma trifolii, var. *albifusa*, 68.

Scutellista cyanea, 245.

Serica tristis, 387.

Sesiid, a new, 372.

Siphocoryne avenæ, 171, 207, 209, 235,
 262.

SLADEN, F. W. L., articles by, 269, 312.

Smicronyx caseyi, n. sp., 10.

" *quadriifer texana*, var. n., 12.

SMITH, L. W., NEEDHAM, J. G., and,
 article by, 80.

SMITH, M. R., article by, 34.

Spharagemon bolli, 279.

Sphingidæ in Heath Collection, 226.

Stelis, key to Canadian species of, 312.
ontariana, n. sp., 312.

Stenophylax, 118.

Stephanitis azaleæ, 255.

Stoneflies of the genus *Peltoperla*, 80.

Strangalia luteicornis, 299.

Streptodiplosis indica, n. gen. et sp.,
 405.

Sunflower insects, 76.

SWAINE, J. M., articles by, 97, 181.

SWETT, L. W., articles by 249, 326, 349.

Sympiesomorphelleus trisulcus, n. sp.,
 103.

Syneta ferruginea, 149.

Syrbula admirabilis, 279.

Syrpophagus quadrimaculata, 344.

Systolodes brevicornis, 339.

Tasmaniomyia, n. gen., 152.

Tettigidea lateralis, 276.

Tettix arenosus, 275.

" *hancocki*, 275.

Teucholabis carolinensis, n. sp., 44.

" *lucida*, n. sp., 43.

Tharops refucorris, 384.

THEOBALD, F. V., article by, 169, 202,
 233, 261.

Thymus, n. gen., 113.

TIMBERLAKE, P. H., article by, 89.

Tipula apache, n. sp., 45.

" *arizonica*, n. sp., 53.

" *aspidoptera*, n. sp., 49.

" *caroliniana*, n. sp., 46.

Tipula comenche, n. sp., 50.

" *guasa*, n. sp., 51.

" *texensis*, n. sp., 48.

Tipulidæ, new nearctic, 42.

Tniepeolus pomonalis, n. sp., 392.

Tomocerolus americana, n. gen. et sp.,
 246.

Tortrix oleracea, n. sp., (Pl. X), 373.

TOWNSEND, C. H. T., articles by 19,
 151.

Trachomyia, n. gen., 160.

Transvaal, sunflower insects in the, 79.

Trichogrammatomyia tortricis, n. gen.
 et sp., 268.

Tricyclopsis, n. gen., 152.

Trimerotropis citrina, 277.

Trimicra empedoides, n. sp., 44.

Trox scaber, 387.

Tryxalis brevicornis, 276.

Uganda, a new *Physothrips* from, 130.

Uriella rufipes, 408.

Urographis fasciatus, 199.

VAN DUZEE, M. C., article by, 23.

WALKER, E. M., articles by, 192, 217,
 248, 257, 291, 314, 414, 427.

Walshomyia texana, n. sp., 30.

WEISS, H. B., articles by, 35, 105, 141,
 215, 255.

WINN, ALBERT F., articles by, 6, 105.

Xanthorhœ defensaria, 349.

" *defensaria californiata*,
 355.

Xanthorhœ defensaria conciliaria, n.
 var., 352.

Xanthorhœ defensaria giganta'ria, n.
 var., 353.

Xanthorhœ defensaria mephistaria,
 355.

Xanthorhœ defensaria suppuraria, n.
 var., 354.

Xanthorhœ defensaria thuna'ria, n.
 var., 352.

Xylomiges, a change of synonymy in,
 367.

Xylotrechus quadrimaculatus, 388.

Zacosmia maculata, 391.

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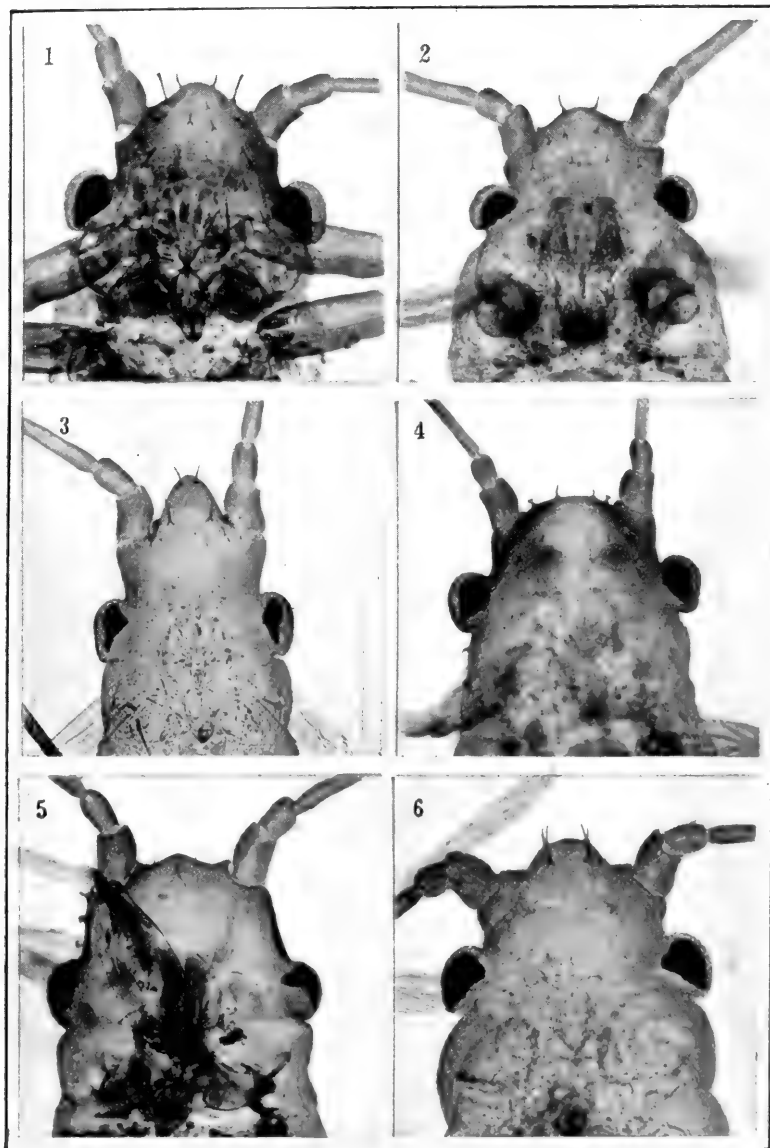
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THE GENUS *SALTUSAPHIS*.

(See p. 8.)

The
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1917.

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VOL. XLIX. LONDON, JANUARY, 1917

No. 1

SYNOPSIS OF THE GENUS *SALTUSAPHIS*. (APHIDIDÆ—HOM.).

BY A. C. BAKER, WASHINGTON, D.C.*

The genus *Saltusaphis* was erected by Theobald for his species *scirpus* from Egypt. A study of a number of American species found on sedges and in marshy localities indicates that there are at least five species of this genus in America. Two of these have been already described in other genera, viz., *Brachycolus ballii* Gill. and *Chaitophorus flabellus* Sanb.

Gillette (Ent. News, vol. XXII, p. 441) has also described another species in the genus *Brachycolus*, but this species, *tritici*, seems to be a typical member of the genus and closely related to the type species, while *ballii* on the other hand is not. *Flabellus*, while described as a *Chaitophorus* by Sanborn, has been re-described by Gillette and placed in the genus *Callipterus*. The erection of Theobald's genus leaves little doubt in regard to the true position of *flabellus*. The genus may be defined as follows:

Genus **Saltusaphis**.

Body somewhat elongate; head large, eyes prominent, without ocular tubercles. Thorax large with well-defined segments. Antennæ of six segments, usually as long as the body; legs with the two anterior pairs of femora somewhat swollen. Cornicles short and cup-shaped; cauda knobbed; anal plate widely bilobed, posterior extremity of dorsum of abdomen sometimes indented, often deeply so. Fore wing with the media twice branched, hind wing with one oblique vein near its extremity. Wing veins usually bordered with dusky brown; sexes apterous, living in marshy regions, usually on sedges.

The species of this genus present a very characteristic appearance on their host plant. They lie closely appressed to the leaf with their antennæ stretched out parallel in front of the head. When disturbed or alarmed they fall suddenly, or spring from the

* Published by permission of the Chief of the Bureau of Entomology.

plant, aided by the large muscles of their anterior and middle femora. All sections of the leaf are attacked, specimens being found close to the ground or far out at the tips of the leaves. The sexes appear on the leaf very similar to the viviparous forms, with the exception of the smaller size. The genus belongs to the Callipterini, but seems to be quite distinct from the other genera in the tribe.

It would appear that Theobald has been led into the error of describing the cauda as bifid by the very marked division on the last abdominal segment in the type species. In examining *scirpus* this is the most apparent structure on the caudal portion of the abdomen. The cauda, however, is distinctly knobbed, and the anal plate in the apterous forms appears almost as two distinct plates. This is more plainly seen in some of the other species than in *scirpus*.

The species may be separated by the following key:

KEY TO SPECIES.

(Based on Apterous Form.)

1. Antennæ not much longer than half the body length, and about equal in length to the distance between the vertex and the hind coxæ.....*ballii* (Gill.).
Antennæ much longer than the distance between the vertex and the hind coxæ, usually as long as the body.....2
2. Posterior extremity of the abdomen quite distinctly bilobed.....3
Posterior extremity of the abdomen not distinctly bilobed.....4
3. Body covered with fan-shaped or sickle-shaped hairs; vertex not strongly conical.....*scirpus* Theo.
Body without hairs excepting simple ones on the caudal portion; vertex strongly conical.....*elongatus* Baker.
4. Body covered with fan-shaped hairs about 0.016 mm. long.....5
Body with slightly knobbed hairs about 0.05 mm. long.....*americanus* Baker

5. Segment III of antenna considerably shorter than width of head across the eyes; colour brownish yellow with blackish markings.....*flabellus* (Sanb.)
Segment III of antennæ considerably longer than width of head across the eyes; colour pale yellowish green with dusky markings.....*virginicus* Baker.

***Saltusaphis americanus*, n. sp.**

Apterous viviparous female.—General colour reddish yellow; vertex dusky brown, which colour extends caudad on each side to form two large dusky lateral areas on top of head; a rather narrow median area yellow. Thorax with a large, irregular, dark brown patch on each side. Abdomen with similar lateral patches which include the cornicles. Cauda dusky. Femora, proximal extremity of the tibiæ and the tarsi dusky brown. Eyes reddish brown. Antennæ brown with base of III yellowish.

Length from vertex to tip of cauda 1.84 mm.; hind tibia 0.64 mm. Dorsum of body covered with hairs which are situated on rather prominent tubercles. These hairs are about 0.05 mm. long and somewhat expanded at their tips. Extremity of the abdomen scarcely at all divided. Cauda and anal plate usual.

The apterous forms of this species are similar in general appearance to those of *flabellus* Sanb., but are easily distinguished from those of that species by the body hairs.

Apterous male.—General colour similar to that of the viviparous form and with similar markings, but these much fainter. Length from vertex to tip of cauda 1.04 mm.; hind tibia 0.608 mm. Body with hairs of about the same length as those of the viviparous form, but with them little, if at all, expanded at tips.

Antennæ with the following measurements: III, 0.48 mm.; IV, 0.32 mm.; V, 0.32 mm.; VI, (0.128+0.256 mm.). Segments very finely and closely imbricated; III, with 20 to 25 very small, circular sensoria in an uneven row along the segment; IV, with 9 or 10; V, with about 9; VI, with sometimes one on the base of segment beside the usual sensoria at the base of the unguis.

Oviparous female.—Colour very similar to that of the viviparous form, with the colours possibly darker. Length from vertex to tip of cauda 1.6 mm.; antennæ as follows: Segment III,

0.576 mm.; IV, 0.32 mm.; V, 0.304 mm.; VI, (0.16 mm.+0.256 mm.). All segments without sensoria excepting the permanent ones. Body hairs similar to those of the viviparous form. Hind tibiae 0.672 mm.; somewhat swollen and thickly covered on its proximal two-thirds with almost circular or somewhat oval sensoria.

Described from specimens on balsam mounts made by Mr. H. B. Scammell, the specimens taken on bog grass, Whitesbog, N. J., Oct. 21, 1914.

Type in U. S. Nat. Museum Cat. No. 20719.

***Saltusaphis ballii*, (Gill.)**

Brachycolus ballii Gillette, Can. Ent., vol. XL, p. 67; Ent. News, vol. XX, p. 119.

Specimens of this species are in the collection of the U. S. Nat. Museum, taken on *Scirpus sylvaticus* at Richfield Springs, N. Y., by Theo. Pergande, No. 4052, and typical specimens on *Carex nebraskiensis* collected at Ft. Collins, Colo., 5-30-10, by Bragg. These later specimens were deposited in the Museum collection as types by Prof. C. P. Gillette. Oviparous females are in the collection taken on 3-square, Whitesbog, N. J., 11-13-15 by H. B. Scammell.

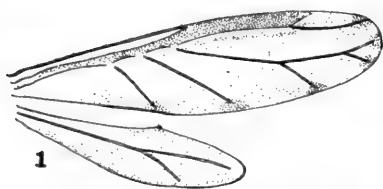
The species has shorter antennae than the other members of the genus, but is very similar in many ways to *americanus* and *flabellus*. The body hairs are short, stout and spine-like.

***Saltusaphis elongatus*, n. sp.**

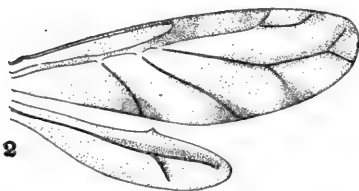
Only oviparous females of this species have been seen by the writer, but since they are so very different from any of the other species in the genus, no difficulty will be experienced in separating the species at once in this form.

General colour orange yellow, uniform, with the exception of a number of dusky flecks along the margins of the abdomen. Eyes deep wine colour; antennae, from the basal portion of segment III to the tip, dark brown to black.

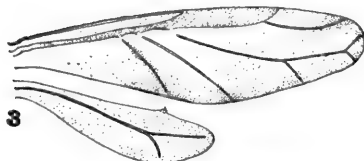
Length from vertex to tip of cauda 2.34 mm.; hind tibiae 0.64 mm.; scarcely at all swollen, and covered on its proximal portion with a number of sensoria. These are nothing like as abundant as in the species *americanus* and *virginicus*. Antennae as follows:



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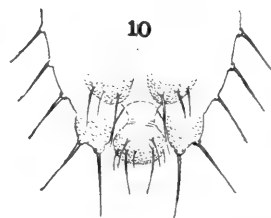
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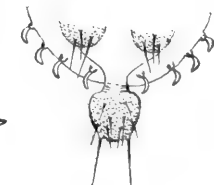
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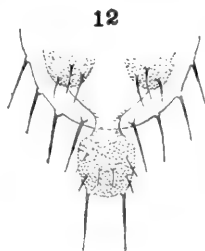
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Segment III, 0.832 mm.; IV, 0.352 mm.; V, 0.4 mm.; VI, (0.176 mm.+0.256 mm.). Vertex much produced, conical, acutely pointed. Cauda and anal plate usual, extremity of the abdomen quite deeply cleft. Body without hairs, excepting at the posterior portion, where it is armed with simple hairs about 0.064 mm. long.

Described from specimens in balsam mounts, the specimens collected by H. B. Scammell and H. K. Plank at Whitesbog, N. J., Oct. 21, 1914. Taken on bog grass.

Type in U. S. Nat. Museum, Cat. No. 20720.

Saltusaphis flabellus (Sanb.)

Chaitophorus flabellus Sanborn—Kans. Univ. Sci. Bul., vol. III, No. 1, p. 37.

Callipterus flabellus (Sanb.) Gillette, Ent. News, vol. XX, p. 120.

Specimens of this species are in the collection of the U. S. Nat. Museum as follows: One specimen taken May 4, 1903, host unknown, at Lawrence, Kansas, by C. E. Sanborn, Type. Specimens collected on *Carex* in May, 1911, and deposited in the collection by Prof. Gillette, and specimens collected by Mr. Bragg on *Carex* at Ft. Collins, Colo., 5-6-12, and deposited in the Museum collection by Prof. Gillette.

There is considerable variation in the colour in the different specimens, some being generally mottled on the dorsum, while others have a distinct, heavy marking down each side on the dorsal area. The fan-shaped spines are, however, the same on all.

Saltusaphis scirpus Theobald.

Saltusaphis scirpus Theobald, Bul. Ent. Research, vol. VI, pt. 2, p. 138.

The writer has never seen alate forms of this species, but through the kindness of Mr. J. J. Davis he has been able to examine an apterous paratype. In the bifid nature of the extremity of the abdomen the species is related to *elongatus*. In other characters, however, it is more closely related to *virginicus*. This resemblance is particularly noticeable in the body hairs. On the posterior extremity of the abdomen the hairs are more elongate than elsewhere, measuring fully 0.048 mm. They are somewhat knobbed, even on the posterior extremity. Only the proximal segments

of the antennæ are present on the specimen. These measure as follows: I, 0.112 mm.; II, 0.064 mm.; III, 0.608 mm.; IV, 0.304 mm. Hind tibia 0.592 mm., hind tarsus 0.144 mm.

***Saltusaphis virginicus*, n. sp.**

Alate viviparous female.—General colour yellowish, marked with dark brown; head with smoky to black background and median yellowish stripe; eyes dark reddish brown. Prothorax similarly marked. Thorax yellow with dark brown lobes; abdomen yellow with lateral row of dark brown or black areas, and with a large, longitudinal, central area of the same colour; antennæ almost uniform dusky. Legs dusky, lighter at the joints, cornicles included on each side within one of the lateral dusky areas. Stigma and wing veins smoky, veins slightly bordered with dusky colour.

Length from vertex to tip of cauda 1.44 mm. Antennæ as follows: III, 0.432 mm.; IV, 0.304 mm.; V, 0.288 mm.; VI, (0.192 mm. + 0.176 mm.). All segments very minutely and closely imbricated. Segment III, with 9 or 10 circular to oval sensoria on the basal two-thirds of the segment in an uneven row. Hind tibiæ 0.688 mm.; hind tarsus 0.112 mm. Fore wing 2.16 mm. long by 0.64 mm. wide. Media distinctly angled. Cornicles very shallow and small. Abdomen densely covered with minute projections.

Apterous viviparous female.—General colour yellowish green. Head unmarked, eyes reddish brown. Body almost uniform yellowish in some specimens, while in others faint, longitudinal, dusky lines are present, extending from the head to tip of abdomen. Antennæ with the basal portion of segment III yellowish, the remainder dusky to black. Legs uniform yellowish or with light dusky areas near the distal extremities of the femora and with the tarsi dusky.

Length from vertex to tip of cauda 2.16 mm.; width across abdomen 0.672 mm., vertex somewhat conical; antennæ as follows: III, 0.464 mm.; IV, 0.336 mm.; V, 0.288 mm.; VI, (0.208 mm. + 0.16 mm.). Hind tibiæ, 0.672 mm.; hind tarsus, 0.128 mm.; entire dorsum covered with small, mushroom or fan-like hairs. Posterior extremity of abdomen scarcely indented.

Apterous male.—General colour similar to that of the apterous viviparous female, but with very little of a yellow tint. Segments

of the body indicated by narrow, smoky, cross stripes. Antennæ black with the exception of the basal two segments and the proximal extremity of segment III. A black rim borders the antennal sockets. Eyes dark brown.

Length from vertex to tip of cauda 1.6 mm. Antennæ as follows: Segment III, 0.4 mm.; IV, 0.256 mm.; V, 0.256 mm.; VI, (0.175 mm.+0.144 mm.). Segment III is armed with a row of about 12 sensoria, which are minute and circular. Segment IV is without sensoria or with 2 or 3 very minute ones. Segment V has a row of about 6, while the base of segment VI has usually the same number. Hind tibia 0.56 mm.; hind tarsus 0.112 mm.

Oviparous female.—Colour very similar indeed to that of the male. The femora, however, have a distinct dusky spot near their distal extremity, and the tibiæ are more dusky than those of the male.

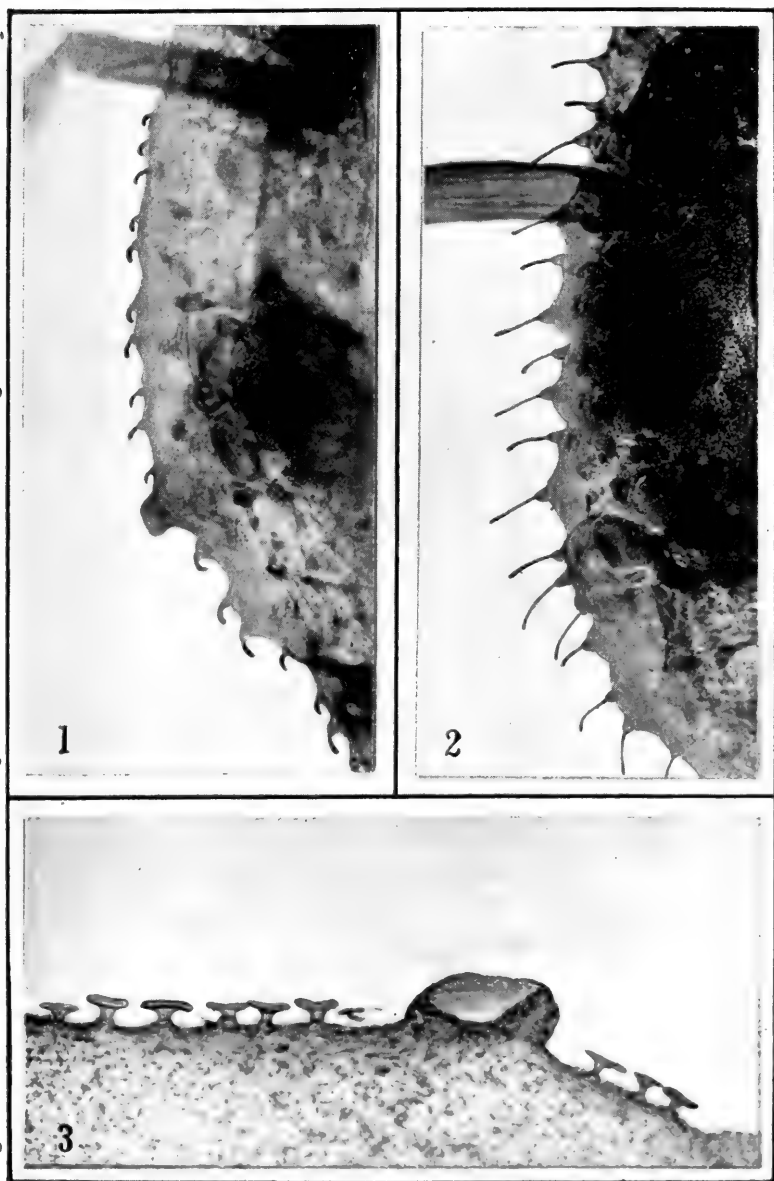
Length from vertex to tip of cauda 1.84 mm. Antennæ as follows: Segment III, 0.416 mm.; IV, 0.304 mm.; V, 0.112 mm.; VI, (0.176 mm.+0.176 mm.). All segments without sensoria, excepting the permanent one. Hind tibia 0.688 mm., somewhat swollen and densely covered with circular, or somewhat elongated sensoria. Body covered with the mushroom-like hairs described in the viviparous forms.

Described from specimens reared by the writer at East Falls Church, Va., during Oct., 1916, on *Carex* sp.

Type in U. S. Nat. Museum Cat. No. 20721.

EXPLANATION OF PLATES I, II AND III.

- Plate 1, Fig. 1. Head of apterous viviparous form of *S. americanus*.
 " " 2. Head of apterous viviparous form of *S. ballii*.
 " " 3. Head of oviparous form of *S. elongatus*.
 " " 4. Head of apterous viviparous form of *S. flabellus*.
 " " 5. Head of apterous viviparous form of *S. scirpus*.
 " " 6. Head of apterous viviparous form of *S. virginicus*.
 Plate 2, Fig. 1. View of portion of abdomen of *S. flabellus* showing hairs.
 " " 2. View of portion of abdomen of *S. americanus* showing hairs.
 " " 3. View of portion of abdomen of *S. virginicus* showing hairs.



SALTUSAPHIS—STRUCTURAL DETAILS.
(See p. 8.)

Plate 3, Fig. 1. Wings of *S. ballii*.

- " " 2. Wings of *S. flabellus*.
- " " 3. Wings of *S. virginicus*.
- " " 4. Segment III of antenna of alate viviparous form of *S. virginicus*.
- " " 5. Segment III of antenna of alate viviparous form of *S. flabellus*.
- " " 6. Segment III of antenna of alate viviparous form of *S. ballii*.
- " " 7. Segment III of antenna of male of *S. virginicus*.
- " " 8. Segment III of antenna of male *S. americanus*.
- " " 9. Caudal extremity of apterous viviparous form of *S. scirpus*.
- " " 10. Caudal extremity of oviparous form of *S. elongatus*.
- " " 11. Caudal extremity of apterous viviparous form of *S. flabellus*.
- " " 12. Caudal extremity of apterous viviparous form of *S. americanus*.
- " " 13. Caudal extremity of apterous viviparous form of *S. ballii*.
- " " 14. Caudal extremity of apterous viviparous form of *S. virginicus*.
- " " 15. Hairs of *S. scirpus*.
- " " 16. Hair of *S. virginicus*.
- " " 17. Hair of *S. flabellus*.

NEW SPECIES OF COLEOPTERA OF THE GENUS
MORDELLISTENA.

BY EMIL LILJEBLAD, CHICAGO, ILL.

Material in the family Mordellidæ, one of the most neglected of the families of the Coleoptera, neglected alike both by the collector and the systematist, has long been sought by the writer. Having accumulated a large number of specimens, and the opportunity having been presented to make a thorough study of the forms at hand, not alone in my cabinet but in that of Mr. A. B. Wolcott, a

few strikingly distinct species have been recognized as yet undescribed. These it is deemed expedient to make known now.

Quite a few other supposedly new species remain, but the author considers it the part of wisdom to await the acquisition of more extensive series before settling upon the validity of these forms.

Unless otherwise indicated, the types of the species herewith described were collected by the writer and are to be found in his collection.

***Mordellistena rutila*, sp. nov.**

Hind tibia with two converging oblique ridges; first joint of hind tarsus with three, and the second with one oblique ridge.

Ferruginous; nearly linear; head black, with front slightly ferruginous; thorax and elytra ferruginous, the latter slightly darker towards apex; under surface ferruginous; anal style very short. Length 4 mm.

One specimen from Eggers, Illinois, July 7. Collected by A. B. Wolcott, in whose collection the type is placed.

This species is most nearly allied to *Mordellistena tosta*, but differs in having the tibial ridges converging, no trace of a third ridge, and the second joint of hind tarsus with only one ridge. It is longer, nearly parallel, and with the head black.

This should be placed in collections after *M. atriceps*.

***Mordellistena exilis*, sp. nov.**

Hind tibia with two equal parallel ridges; first joint of hind tarsus with four, second with two ridges.

Black; nearly linear; head, mouth-parts and thorax ferruginous, the last with a black median line reaching to middle; antennae a little darker at apex; front legs and middle femora ferruginous, the middle tibia and tarsi darker; hind femora and apex of tibia and tarsal joints black. Elytra black, with testaceous pubescence. Beneath black, with coarser testaceous pubescence; anal style long and slender. Length 4 mm.

One specimen from Ft. Sheridan, Illinois, August 7.

This species has the form and size of *Mordellistena marginalis*, but is at once distinguished by the tibial ridges.

This is to follow *M. tosta* in a systematic arrangement.

***Mordellistena rufa*, sp. nov.**

Hind tibia with two ridges, the anterior extending across the outer face of the tibia; first joint of hind tarsus with four and the second with two ridges.

Ferruginous; elytra with the lateral margins from base to the middle and the suture black. Mesosternum black; hind coxal plate and abdomen clouded with black; anal style long and slender. Length 4 mm.

One specimen from Palos Park, Illinois, May 28.

This species resembles *M. ustulata*, differing only in the ridges. It should follow *M. splendens*.

***Mordellistena insolita*, sp. nov.**

Hind tibia with three oblique ridges, the upper one less developed; the first and second joints of hind tarsus with three and the third with two small ridges.

Subcuneate; head, thorax, anterior and middle femora ferruginous, tibia and tarsi darker; hind legs and under surface black, with cinereous pubescence. Elytra black, with silky, iridescent pubescence; anal style black, long and slender. Length 5 mm.

Two specimens from Lee County, Texas, April 1. Collected by Rev. G. Birkmann. Paratype in collection of A. B. Wolcott.

This species somewhat resembles *M. texana*, but differs in the tibial and tarsal ridges, *texana* having four ridges on the tibia, and not any ridge on the third joint of the hind tarsus. It should follow *M. singularis*.

***Mordellistena vera*, sp. nov.**

Hind tibia with three oblique ridges and a rudiment of a fourth; first joint of hind tarsus with four, second with two, and third with two ridges.

Black; head and thorax sparsely covered with testaceous pubescence; base of antennæ, mouth-parts and legs reddish brown. Elytra covered with silky, reddish-brown pubescence, more densely on the suture, and forming a narrow, sutural line. Beneath black, with testaceous pubescence; abdominal segments reddish at apex; anal style long and slender. Length 5-5.5 mm.

Three specimens. Type from St. Louis, Missouri, July 7.

Paratypes from Paw Paw Lake, Michigan, August 18, and Evanston, Illinois, July 2; the latter in collection of A. B. Wolcott.

Nearest allied to *M. unicolor*, but differs in size, being much longer, more robust and having two ridges on the third joint of hind tarsus. It should follow *M. schauppii*.

***Mordellistena pulchra*, sp. nov.**

Hind tibia with three oblique ridges, the upper more oblique; first joint of hind tarsus with four, second with three oblique ridges.

Black; head ferruginous, with a dark cloud on vertex; mouth-parts dark; thorax rufous, with a narrow margin, the base, apical angles and a median line black; antennae dark brown; first and middle legs with femora black, the tibia and tarsi ferruginous; hind legs ferruginous, the tarsal joints black at apex. Elytra black, with fine cinereous pubescence; a wide rufous vitta from base nearly to apex. Beneath black, with sides of hind coxal plates and basal joints of abdomen ferruginous; anal style short and slender, apical two-thirds black. Length 4 mm.

One specimen from Bowmanville, Illinois, August 18.

Judging from the original descriptions, this species has the colour and size of *M. attenuata* Say or *vittigera* Lec., but the tibial and tarsal ridges are entirely different. It should follow *M. aequalis*.

***Mordellistena wolcotti*, sp. nov.**

Hind tibia with three rather short, oblique ridges, which extend only one-third across the outer face of the tibia, and two small rudimentary ridges; first joint of hind tarsus with six ridges, three small or rudimentary; second joint with two ridges.

Form robust; head and thorax black, coarsely covered with silky, yellowish pubescence; base of antennae and mouth-parts ferruginous; legs fuscous. Elytra rufous, slightly darker towards apex, with the base, suture, an oblique vitta from humerus to the middle, and a slightly oblique band behind the middle and apex, with silky, golden-yellow pubescence; beneath black, with yellowish pubescence; anal style long and slender, fuscous. Length 4.5 mm.

One specimen from McGregor, Iowa, July 16. Collected by A. B. Wolcott, in whose collection the type is placed.

This species is very unique, and I do not know of any described species that it at all resembles. It should follow *M. pulchra*.

***Mordellistena gigas*, sp. nov.**

Hind tibia with four very oblique ridges; first joint of hind tarsus with five, second with two, and third with one oblique ridge.

Subcuneate; head, thorax, mouth-parts, base of antennæ, and legs rufous. Elytra black, finely punctured, with reddish brown iridescent pubescence; basal margin, a short oblique humeral vitta, narrow lateral margin and entire suture with golden yellow pubescence. Beneath testaceous; mesosternum, hind coxal plates, and the basal margins of first and second segments of abdomen fuscous; anal style fuscous at apex. Length 6 mm.

One specimen from Edgebrook, Illinois, July 10.

This is one of the largest species of *Mordellistena* I have seen. It is likewise a very handsome species, and may readily be recognized by its distinct colour and number of ridges. It should follow *M. fusco-atra*.

RECENT STUDIES OF CANADIAN SPIDERS.

BY J. H. EMERTON, BOSTON, MASS.

For many years past I have worked on the spiders of New England, and as these have become better known and the collections more complete, have from time to time wandered over into adjoining territory. In the summer of 1916 I made a visit to the neighbouring part of Canada, with the object of seeing where and how far the familiar species extended in that direction. All authorities agreed that it was best to start early, so the cold and rainy weather of the middle of June found me at Ottawa, in company with Mr. W. T. M. Forbes, the lepidopterist, consulting with the resident entomologists where it was best to go and how to get there. The Ottawa Field Club had an outing the next day, and in that helpful company I began operations at the Experimental Farm, the umbrella, which had become a constant companion, serving to catch the spiders shaken from hedges and the specimen trees of the Arboretum. As the weather improved, Mr. Gibson took us to the old lumber camp in Chelsea and up King's Mountain, and later I

went north to the end of the railroad at Maniwaki. At Montreal, after a day in the cleared-up shrubbery of Mt. Royal and a fruitless visit to St. Hilaire, we, at last, with the help of Mr. Winn and Mr. Corcoran, found the way to some still unspoiled country on the farther side of Westmount, where, in a boggy wood, we found the same forest spiders as in the uncultivated spots at Ottawa and Hull. Consulting with the Montreal entomologists about the hilly country to the north we were recommended to Montfort, which proved to be an excellent collecting ground, with ponds and bogs 1,500 feet or more above the sea and a fauna of a more northern character than Montreal. Next we went to Sherbrooke and Megantic, but met wet weather again and only got a few samples of the local spiders. At Quebec, however, there was a week of fine weather, and following the directions of Mr. Boulton I explored the Gomin bog, and went for a couple of days to Beaupré and up Cap Tourmente. My time was now getting short, but I took the steamboat up the Saguenay and spent a day at Chicoutimi and in a flying visit to Lake St. John. About a hundred species of spiders were taken during this trip, and nearly all of these were species well known in Maine and New Hampshire, and most of them all over New England and New York. A little north of the St. Lawrence River and up out of the valley were a few species which occur only in Northern Maine and the upper forests of the White Mountains. Probably nearly all the species known in New England extend much farther north and west, and fifty of them are already known to extend across Canada to the Rocky Mountains, most of them following the southern border of the spruce forest belt. The best examples of these are two species which live in cobwebs between the branches of small spruce and balsam trees and are comparatively easy to find. Their distribution, as far as known, is shown on the maps. One, *Theridion zelotypum*, extends over the whole of Maine except the southwest corner. It crosses New Hampshire at Lake Umbagog and Dixville Notch and extends north of the Canadian boundary as far as Ottawa. It does not occur in the White Mountains, the Adirondacks, Northern Vermont nor around Toronto. Farther west it begins again at Nipigon, on Lake Superior, and continues westward in spruce bogs to Prince Albert, Athabaska Landing, and Jasper Park in the Rocky Mountains.

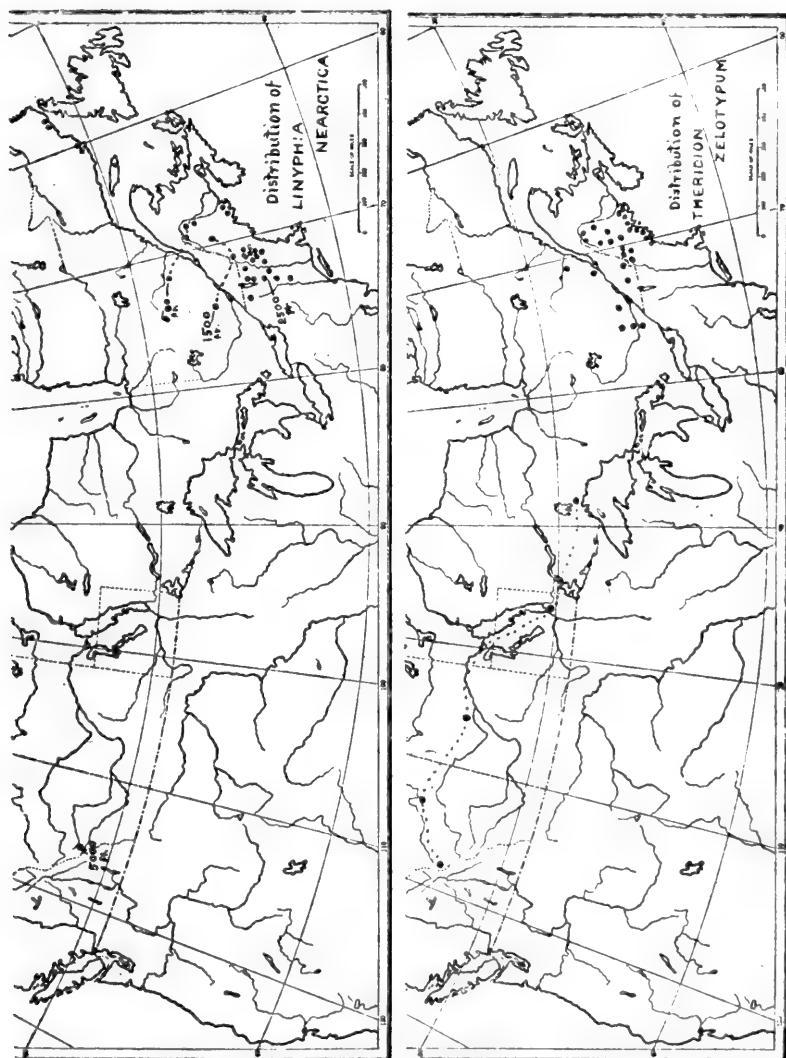


Fig. 1.—Distribution of *Theridion zelotypum* and *Linyphia nearctica*

Its northern limits are unknown. The other species, *Linyphia nearctica*, lives in the forests of the New England mountains from 2,500 feet up to 4,500 feet, or as far as trees grow. At Montfort, in the hills north of Montreal, at Dixville Notch and on Mt. Kinca, Me., it comes down to 1,500 feet. At Lake St. John and in Northern Maine it lives at the general level of the country, below 500 feet, and on the coast of Labrador and at Eastport, Me., at the sea level. Its range westward has not been traced, but it occurs at Laggan in the Rocky Mountains at an elevation of 5,000 feet.

As the maps show, there are gaps to be filled in the distribution of even these common species. The *Theridion* probably follows westward along the Ottawa River and Lake Huron to Lake Superior. The *Linyphia* probably crosses Ontario farther north, perhaps along Hudson Bay. These two species outline, as well as anything does, the so-called Canadian life zone. South of it another set of spiders occupy the country, and some of the species common in the meadows of Boston or Toronto are also common around the ponds of Edmonton. On the west coast another fauna extends north to Alaska and its species mix through the mountains with the other groups, some as far east as Medicine Hat. On the east coast, arctic species extend southward along the shores of Labrador and Newfoundland as far as Maine. I have tried to give here the outlines that the study of Canadian spiders has to fill in, and it is gratifying to see how much is being done in this interesting field. At the Park Museum in Banff there is already a local collection of over fifty species, which is increased every season by the curator, Mr. Sanson. At the Royal Ontario Museum in Toronto is a larger local collection and an interesting set of spiders from various points across the country from Nipigon to Vancouver Island, collected chiefly by Mr. T. B. Kurata. At Ottawa are the spiders collected before 1890 by J. B. Tyrell and other early explorers of the Geological Survey, and more recent collections made in the way of their other work by entomologists in all parts of the Dominion. Small collections of Canadian spiders from several correspondents are coming in this winter, and I am beginning to think about another summer excursion in Canada.

POPULAR AND PRACTICAL ENTOMOLOGY.

THE PLUM CURCULIO IN ONTARIO, NATURE AND EXTENT OF THE
INJURIES, CONDITIONS FAVOURING THE INSECT, AND
MEANS OF CONTROL.

PART II—CONDITIONS FAVOURING THE INSECT, AMOUNT OF
DAMAGE DONE, AND MEANS OF CONTROL.

BY L. CAESAR, GUELPH, ONT.

(Continued from vol. XLVIII, page 400.)

As the Curculio winters, in the adult stage, under rubbish or in any good hiding place, and as the better the opportunities for good winter quarters the larger number of beetles that will come safely through the winter, we should naturally expect that orchards or parts of orchards bordering on thick woods, or waste places where long grass, weeds, brush or other rubbish abounds, or orchards that are badly neglected and have an abundance of weeds and rubbish within their own borders, would be worst infested. Such is the case, for, as a rule, in Ontario it is only orchards of this type that do suffer much from the Plum Curculio.

AMOUNT OF THE INJURY.

No accurate estimate of the amount of injury has been made for the Province as a whole, but I believe I am right in saying that the fruit in well-cultivated and well-sprayed orchards with clean surroundings suffers only to a very small extent, probably not more on an average than 1% to at most 5%. On the other hand the loss in neglected orchards or in the parts of well-cared-for orchards immediately adjoining ideal winter quarters for the beetle is sometimes very great. Under such circumstances apricots, plums and sweet cherries sometimes have almost every fruit stung and destroyed, and nearly half of the apples, even on trees that are heavily laden, may be attacked and drop, or if the crop is a light one nearly all may be destroyed.

The injury in the fall and late summer to peaches and apples seems to vary with the season. This year in the Niagara District in orchards where there is no doubt at all that there were thousands of new beetles in August and September, very little injury was done, only an occasional apple here and there, even in the dirtiest of sur-

roundings, being attacked, though in rearing cages the beetles fed freely upon the fruit. Some years, however, the beetles do a great deal of damage in late summer and autumn. For instance, in Prince Edward County one fruit-grower to whom I showed the sort of injury done by the beetles at that time of the year, stated that he had that year 15 tons of apples rendered culls by such injuries. Next year, after he had carried out the suggestions given below for control, he reported very little loss.

MEANS OF CONTROL.

1. *Natural enemies*.—There is no doubt that climatic conditions, as they vary from year to year, play a very important part in determining the relative abundance or fewness of these insects. They are also held in control to some extent by various predaceous and parasitic insects and by other animals, but not to such a degree as to allow us to rely on them alone.

2. *Clean surroundings*.—The first step in the control of the Curculio should be a general cleaning up of the orchard itself and of its surroundings so far as this is practicable. Get rid of all rubbish, cut down thickets, remove stone piles, burn off old grass and all brush. In this way the favourable conditions for hibernation are removed.

3. *Cultivation*.—It is seldom that one sees a well-cultivated orchard badly infested. Cultivation, especially if it can be continued into the month of July without danger of winter injury to the trees, will kill the pupæ in their easily broken earthen cases in the soil. It also seems to help in other ways, and by letting the sunlight beat upon the fallen, infested apples and killing the larvæ within by the excessive heat. Good pruning would also help in this way.

4. *Spraying with arsenicals*.—The best spray to use is arsenate of lead at the strength of from 2 to 3 lbs. to 40 gallons of dilute lime-sulphur (strength 1.008 sp. gr.) or Bordeaux mixture. The lime-sulphur or Bordeaux is added to control diseases. Fortunately the proper time to spray apples for this pest is just after the blossoms have fallen, which is, of course, the right time for the Codling Moth, and also one of the most important times for the scab fungus. The spraying, to get best results on all three things, should be very heavy

and thorough. If this work is well done, only in very badly infested orchards will it have to be repeated. In the latter case the best time to give the extra application will be in about 12 or 14 days after the one just mentioned. Plums and cherries should be sprayed with the same mixture, first, as soon as the fruit has set and the calyces have fallen, and then again in about two weeks' time. Occasionally a third application two weeks later may be desirable. Peaches should be sprayed soon after the fruit is well set and all the enveloping parts of the flower have dropped, so that the poison can cover the whole fruit. No lime-sulphur should be used, but only water or water with 1 or 2 lbs. of freshly slaked lime to every 40 gallons. One spraying is sufficient for Ontario conditions if well given. Many peach orchards do not require any spraying for this pest.

It is well to remember that all the above methods should be combined in the control of the Plum Curculio, for spraying alone though it will reduce the number of the insects will not thoroughly control them, and experience has shown that cultivation and clean conditions in and around the orchard are of very great value. Jarring used to be recommended, but in the writer's opinion is impracticable under modern conditions of fruit-growing.

THE SHELL-BARK HICKORY MEALY-BUG.

BY A. H. HOLLINGER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

(Continued from vol. XLVIII, page 413.)

DESCRIPTION OF ADULT FEMALE.

Adult female when mounted: varying from 2.6 mm. x 2.2 mm. (at the beginning of oviposition) to 5.7 mm. x 2.4 mm. (at the height of oviposition). Beak well developed and two-segmented, about 175 x 235 microns, the distal segment being about as long as the beak is wide; numerous setæ are borne on the beak; innumerable body setæ, averaging about 50 microns long, occur on both surfaces of the derm; in addition, innumerable, small (2 to 3 microns), obscurely triangular gland-pores occur all over the derm; also some slightly larger, circular gland-pores are in the cephalic region, and also along each abdominal segment and scattered

through the thoracic region; antennæ of two formulæ; 82137546 and 8(21)37564, (see figure 2, h); the graphic representation of

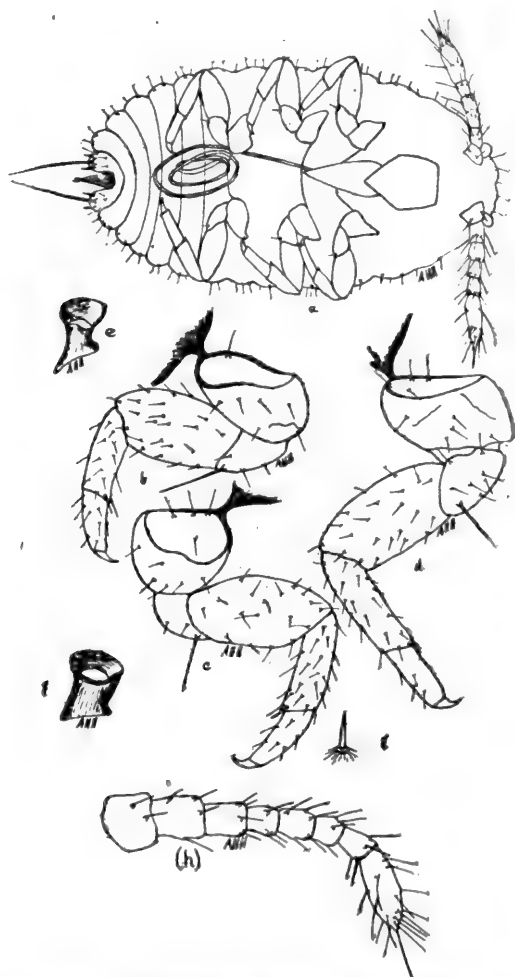


Fig. 2.—*Pseudococcus jessica*, n.sp.; adult female.

the antennal segments as per diagram, (see figure 3); each segment bears several setæ and is relatively stout, the width of the

antennae averaging about 45 microns; the legs are relatively short and thick set, the extreme measurements being as follows:

	Coxa.	Tro.	Femur.	Tibia.	Tarsus.
Prothoracic leg (see figure 2, b).....	88 x 126 103 x 126	103 x 59 115 x 50	188 x 100 206 x 100	147 x 50 144 x 44	94 x 35 100 x 41
Mesothoracic leg (see figure 2, c).....	94 x 141 118 x 150	109 x 59 118 x 74	206 x 106 221 x 109	141 x 53 173 x 50	82 x 44 106 x 38
Metathoracic leg (see figure 2, d).....	112 x 147 123 x 141	112 x 65 129 x 77	206 x 103 235 x 109	159 x 50 188 x 56	103 x 38 118 x 47

Tarsal claws vary from 32 to 40 microns; legs bearing numerous setae; the anal lobes are undeveloped, but each bearing its usual long seta, 132 microns long; setae of the genital opening are about 100 microns long; spiracles stout with undeveloped, cup-shaped disc,

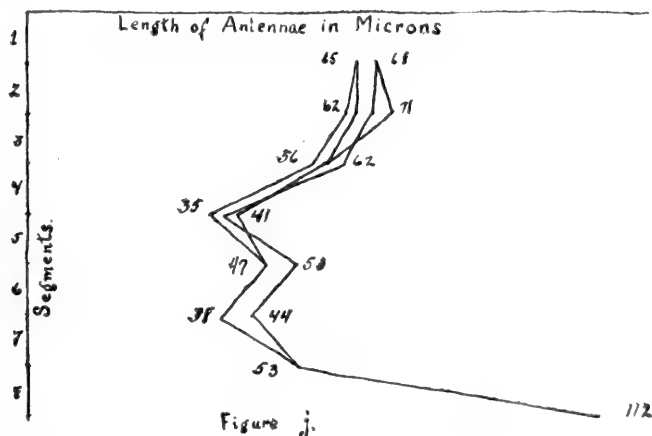


Fig. 3.—*Pseudococcus jessica*, n.sp.; measurements of antennal segments.

see figures (e) and (f); body setae, in caudal region especially, numerous and well developed; "circumgenital" type of gland-pores are located in the region of the genital opening but are not numerous, being scattered; cerari developed only in the caudal region, (see figure 2, g, which represents a conical seta of the anal cerari.)

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA).
PART II.*

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

This paper is a continuation of the first part under this title (Can. Ent., vol. XLVIII, pp. 42-53, February, 1916). Unless stated otherwise the types of the new species are in the collection of the author.

Family *Tipulidæ*.

Subfamily *Limnobiinæ*.

Tribe *Limnobiini*.

Genus *Dicranomyia* Stephens.

***Dicranomyia mel'eicauda*, sp. n.**

Antennæ black throughout; thorax dark brown, the mesonotal stripes very dark brown, wings with the stigma short, oval, very dark brown; abdomen dark brown with the ventral lobes of the male hypopygium light yellow.

Male.—Length 5.8-6.7 mm.; wing 6.5-7.6 mm.

Rostrum and palpi black. Antennæ black throughout; segments of the flagellum uniformly oval. Head black with a very sparse, grayish bloom.

Mesonotum dark brown with a golden yellow bloom, most apparent on the lateral margins of the præscutum and the median area of the scutum, præscutal stripes shiny, dark brown, particularly without pollen; scutellum dark brown, postnotum with a dense, yellowish gray bloom. Pleura dark brownish black with a grayish bloom on the posterior sclerites, more golden yellow on the anterior sclerites. Halteres dark brown, the base of the stem more yellowish. Legs with the coxæ brown, sparsely gray pruinose; trochanters and femora dull yellow, the latter soon passing into dark brown; tibiæ and tarsi dark brown. Wings with a slight dusky or grayish tinge; stigma very prominent, oval, dark brown; veins dark brown. Venation: *Sc* short, ending about opposite the origin of the sector; *Sc*₂ rather distant from the tip of *Sc*₁, this distance about equal to the short, oval stigma; *Rs* elongate, arcuated at origin, more than twice the length of the basal deflec-

* Contribution from the Entomological Laboratory of Cornell University.
January, 1917

tion of R_{4+5} ; basal deflection of Cu_1 at the fork of M ; cell 1st M_2 closed.

Abdomen black, the basal segments indistinctly reddish medially, the caudal margins pale; basal sternites yellowish, the apical segments dark brown. Male hypopygium with the fleshy ventral lobes bright honey-yellow, the remainder of the hypopygium black, in great contrast with these lobes.

Habitat.—Colorado.

Holotype, ♂, Bear Creek, Morrison Co., Colorado; October 20, 1915 (Oslar).

Allotype, ♀, with the type.

Paratopotypes, 20 ♂ ♀.

Tribe *Antochini*.

Genus *Antocha* Osten Sacken.

***Antocha monticola*, sp. n.**

Antennæ brown; head grayish yellow; thoracic dorsum without stripes.

Male.—Length 5.5 mm.; wing 7.1 mm.

Female.—Length 5–6.4 mm.; wing 7–8 mm.

Rostrum and palpi dark brown. Antennæ dark brown with a coarse, white pubescence; flagellar segments rather small, the two or three apical segments longer than those segments immediately before them. Head grayish yellow, with an indistinct, narrow, dark brown median line.

Pronotum dark brown. Mesonotum light brownish yellow without distinct stripes; median area of the præscutum behind more grayish pruinose; scutum light yellow, the median area grayish pruinose; scutellum yellowish white; postnotum brown. Pleura pale grayish yellow. Halteres short, pale yellow, the knobs brown. Legs with the coxæ pale yellow; femora yellow, a little darkened apically; tibiæ brownish yellow, slightly darker at the extreme tips; tarsi dark brown. Wings whitish opalescent; stigma elongate, indistinct, yellowish; veins pale brown. Venation: cross-vein r present; cell 1st M_2 small; basal deflection of Cu_1 before the fork of M .

Abdomen brownish yellow above, the apical segments darker; hypopygium orange.

Habitat.—Colorado.

Holotype, ♂, Platte Canyon, Colorado; July 17, 1915 (Oslar).

Allotype, ♀, with the type.

Paratopotype, ♀.

Differs from *A. saxicola* O. S. of Eastern North America in the antennal flagellar segments less elongated and paler coloured; head more yellowish, the thorax without stripes, etc.

Tribe *Eriopterini*.

Genus *Ormosia* Rondani.

***Ormosia nimbipennis*, sp. n.**

Coloration reddish brown; wings dusky gray; cell *1st M*₂ of the wings open, the outer deflection of *M*₃ lacking; anal veins convergent.

Male.—Length 4 mm.; wing 5.8–6 mm.

Female.—Length 5.4 mm.; wing 6.3 mm.

Rostrum dull yellow; palpi brown. Antennæ moderately elongate, uniform dark brown throughout. Head brownish gray.

Mesonotum reddish brown without distinct stripes; interspaces with a dense, yellow pilosity; tuberculate pits remote from the anterior margin of præscutum and closely approximated, separated from one another by a distance about equal to one-half the diameter of one; postnotum with a slight grayish pruinosity. Pleura pale brown with a sparse, gray pruinosity; sternum dull yellow. Halteres pale yellow. Legs with the coxæ and trochanters dull yellow; femora dull yellow, only a little darkened apically; tibiæ and tarsi dark brown. Wings dusky gray; costal region and the stigma brownish; veins dark brown; wing membrane with abundant, short, appressed, black hairs. Venation: cell *1st M*₂ open, the outer deflection of *M*₃ being absent; cross-vein *r* usually a little shorter than the portion of *R*₂ before it; *R*₂₊₃ about equal to the deflection of *R*₄₊₅; petiole of *M*₂ short, less than the basal deflection of *Cu*₁; anal veins convergent.

Abdomen dark brown, the hypopygium a little lighter; hypopygium with the pleural appendages acicular at their apices, black; a prominent median appendage, rectangular, the base and head slightly expanded, the latter squarely truncated or slightly concave across the tip.

Habitat.—Northeastern United States.

Holotype, ♂, Woodworth's Lake, Fulton Co., New York; altitude 1,600 feet; August 13, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 10 ♂ ♀.

***Ormosia mesccera*, sp. n.**

Related to *O. monticola* O. S.; antennæ shorter and the flagellar segments not so greatly attenuated; wings more nearly hyaline.

Male.—Length 3.7–3.8 mm.; wing 4.4–4.8 mm.

Rectrum and palpi dark brown. Antennæ dark brown; segments only moderately elongated, not greatly attenuated as in *monticola*; each flagellar segment with a slight, apical, narrowed stem that is equal to about one-half the basal swelling; each segment with abundant rather short hairs and verticils. Head dark brown.

Pronotal scutellum dull, light yellow. Mesonotum reddish with a sparse, gray bloom; thoracic stripes indistinct. Pleura pale brown, very sparsely gray pruinose. Halteres short, the knobs large, pale brown. Legs with the coxæ and trochanters pale yellowish brown; femora dark brown, paler basally; tibiæ and tarsi brown. Wings pale grayish subhyaline, the costal region and stigma more brownish; veins dark brown. Venation: cell 1st *M*₂ open; anal veins slightly convergent.

Abdomen dark brown, the hypopygium a little more reddish. Hypopygium with the pleural appendages short, blunt, slightly curved.

Habitat.—Northeastern United States.

Holotype, ♂, Simmon's Woods, Gloversville, Fulton Co., New York; altitude 900 feet; June 22, 1916 (Alexander).

Paratopotype, ♂.

Related to *O. monticola* O. S. (Mon. Dipt. N. Am., pt. 4, pp. 145, 146; 1869), but the antennal segments much shorter, the individual segments of the flagellum not greatly attenuated and with the hairs and verticils shorter; no indication of the paler apices to the flagellar segments, and the hypopygial details different.

O. monticola is a late summer species, most abundant in August; *O. mesocera* appears to be more vernal in its appearance on the wing.

***Ormosia megacera*, sp. n.**

Related to *O. divergens* Dietz; antennæ of the male elongated, nodulose; anal veins strongly divergent; body coloration dark brown; appendages of the male hypopygium strongly curved.

Male.—Length 3.3–3.7 mm.; wing 4.8–6 mm.

Rostrum and palpi short, dark brown. Antennæ dark brown; flagellar segments greatly elongated, tapering at both ends, especially apically; hairs and verticils on the segments as long as the segments themselves; whole antennæ nearly as long as the body. Head dark brown.

Pronotum pale whitish. Mesonotal præscutum dark brown with three still darker brown stripes, the median one very broad; scutum brown, the lobes with darker centres; scutellum and post-notum dark brown, sparsely gray pruinose. Pleura and sternum dark brown, rather heavily gray pruinose; dorso-pleural membranes dirty yellow. Halteres dark brown, the extreme base yellowish. Legs with the coxæ pale gray; trochanters and femora pale, the latter darker apically, tibiæ and tarsi dark brown. Wings almost hyaline, but with a faint, gray tinge; costal area a little more suffused; stigma ill-defined; veins dark brown. Venation: cell 1st M_2 open, the outer deflection of M_3 lacking; anal veins strongly divergent; 2nd A short and straight.

Abdomen dark brown, including the hypopygium; hypopygium with the pleural appendages black, in the form of chitinized hooks that are strongly curved.

Habitat.—Northeastern United States.

Holotype, ♂, Simmon's Woods, Gloversville, Fulton Co., New York; altitude 900 feet; June 22, 1916 (Alexander).

Paratopotypes, 2 ♂'s.

Related to *O. divergens* Dietz (Trans. Am. Ent. Soc., vol. 42, p. 144; 1916) which is reddish brown in colour, and the hypopygium of the male very differently constructed.

Genus *Trimicra* Osten Sacken.

***Trimicra angularis*, sp. n.**

Antennæ black; head yellow with a black median line; præscutum yellow with three dark brown stripes; pleura yellow with two stripes; abdomen yellow with the segments marked with brown; wings gray with sparse brown markings.

Male.—Length 5 mm.; wing 5.2 mm.

Rostrum and palpi brown. Antennæ with the first segment yellowish; remainder of the antennæ dark brownish black, the flagellar segments short-cylindrical. Head broad, light yellow, palest on the front, richer on the vertex and occiput; a dark brown linear mark on the head.

Mesonotal præscutum light yellow, with three very broad, dark brown stripes that are confluent behind, the middle stripe ending before the transverse suture; tuberculate pits at nearly mid-length of the sclerite, rather linear, separated by a distance equal to nearly twice the short diameter of one; scutum light yellow, the lobes largely dark brown, this consisting of two confluent blotches; scutellum light yellow, broadly dark brown medially, broadest anteriorly postnotum yellowish basally, brown caudally. Pleura yellow with two indistinct and somewhat interrupted lateral stripes, the dorsal one passing above the root of the halteres, the ventral one including the sides of the sternum; sternum yellow, except the sides and a narrow, dark brown, median line on the mesosternum; dorso-pleural membranes dusky. Halteres yellow. Legs with the coxæ and trochanters light yellow; remainder of the legs broken. Wings broad, the anal angle prominent; membrane light gray with small, grayish brown spots as follows: At the origin of *Rs*, at *r*, tip of *R*₁, fork of *Rs*, along the cord and outer end of cell 1st *M*₂; veins dark brown. Venation: *Sc*₂ far removed from the tip of *Sc*₁, lying just distad of the origin of *Rs*; *r* lying far from the tip of *R*₁, this distance equal to about one-half of *Rs*; cell 1st *M*₂ closed, narrowed at its inner end; basal deflection of *Cu*₁ far before the fork of *M*; second anal slightly bisinuate.

Abdominal tergites dull yellow, more brownish basally, a dark brown median blotch on each segment; sternites dull yellow, dark brown medially, the apical segments clearer yellow. Hypopygium with two broad, flattened lobes under the 9th tergite, these heavily chitinized on their dorsal edges; pleurites long, slender, somewhat digitiform; appendages black.

Habitat.—Utah.

Holotype, ♂, mouth of Bear River, Utah; Sept. 16, 1914 (A. Wetmore).

Type in the collection of the United States Biological Survey.

The reference to *Trimicra* is somewhat provisional, although probably correct.

Genus *Rhabdomastix* Skuse.

Subgenus *Sacandaga* Alexander.

***Rhabdomastix flava colcadaensis*, subsp. n.**

Allied to *R. flava flava*; antennal flagellum black; pleuræ white-pruinose; femora and tibiæ tipped with brownish; wings with R_2 almost perpendicular to R_{2+3} ; R_3 almost straight; m very long.

Male.—Length 5.5 mm.; wing 6.9 mm.

Rostrum and palpi brown. Antennæ with the first scapal segment yellowish, the remainder of the organ black. Head pinkish gray with a very narrow and indistinct median line of darker.

Pronotum yellowish, a little browner medially, the sides of the scutellum whitish. Mesonotal præscutum dull whitish yellow, dusted sparsely with a grayish pollen, and with three broad, reddish-brown stripes; the broad, middle stripe ends far before the transverse suture and is slightly bifid caudally; scutum with the median area whitish, the outer lateral portions of the lobes dark brown; scutellum bright yellow; postnotum reddish brown, sparsely pruinose. Pleura yellow, more bluish white pruinose on the mesopleurites. Halteres light yellow. Legs with the coxæ brownish; trochanters dull yellow; femora light brown, broadly tipped with dark brown; tibiæ brown, very narrowly tipped with darker; tarsi brown. Wings opalescent, subhyaline; costal region a little more yellowish; stigma ill-defined, yellowish brown, veins dark brown. Venation: R_2 short, almost perpendicular to R_{2+3} at the fork; cross-vein m very long so that the outer deflection of M_3 is greatly reduced, almost punctiform.

Abdominal tergites brownish yellow; sternites a little brighter.

Habitat.—Colorado.

Holotype, ♂, Platte Canyon, Colorado, July 17, 1915 (Osler).

Close to typical *flava* Alexander of Northeastern America, but sufficiently distinguished by the black antennal flagellum, the mesopleura more whitish pruinose, the femora and tibiæ tipped with brown and in the slightly different venational details.

Genus *Crypteria* Bergroth.***Crypteria americana*, sp. n.**

Body coloration reddish, wings subhyaline, the radial cross-vein present.

Female.—Length 5 mm.; wing 6.4 mm.

Rostrum brownish yellow; palpi brown. Antennæ dark brown throughout; fusion segment composed of the first five flagellar segments; remaining nine flagellar segments elongate-oval. Head clear, light gray.

Thoracic dorsum reddish with a very sparse whitish bloom; stripes indistinct; a small group of long, black bristles on each side of the pronotal scutum, mesonotal præscutum with a row of similar bristles on each side of the broad median area; scutellum more yellowish. Pleura yellow, with a sparse, bluish bloom on the mesopleurites. Halteres pale, the knobs a little darker. Legs with the coxæ and trochanters light yellow; femora light brown, a little brighter basally, tibiæ and metatarsi light brown; remainder of tarsi dark brownish black. Wings grayish subhyaline; veins dark brown. Venation: Sc_1 elongate, ending just beyond the radial cross-vein; Sc_2 removed from the tip of Sc_1 to a distance about equal to the basal deflection of Cu_1 ; Rs elongate, arcuated; R_{2+3} moderate, a little longer than cell 1st M_2 ; cross-vein r present; basal deflection of R_{4+5} short; cross-vein $r-m$ long, arcuated, cell 1st M_2 elongate, pentagonal; cell M very deep, a little longer than its petiole; basal deflection of Cu_1 just before the middle of cell 1st M_2 ; second anal vein very elongate, subsinuate, ending about opposite the middle of the long sector.

Abdominal tergites brown; sternites light yellow; valves of the ovipositor elongate, strongly upcurved.

Habitat.—Oregon.

Holotype, ♀, Mt. Angel, Oregon (F. Epper).

Type in the collection of the United States National Museum.

This interesting crane-fly is the first described, New World representative of the genus. It agrees closely with the genotype, *C. limnophiloides* Bergroth of northern Europe, differing in the more reddish body coloration and in certain venational features, especially in the retention of the radial cross-vein.

Tribe *Pedicini*.Genus *Tricyphona* Zetterstedt.***Tricyphona autumnalis*, sp. n.**

Allied to *T. calcar* O. S.; female with the wings semi-atrophied and the valves of the ovipositor straight; male with the hypopygium provided with conspicuous long hairs.

Male.—Length 13.5–15 mm.; wing 13.5–14 mm.

Female.—Length 20 mm.; wing 9.6 mm.

Male.—Rostrum dull yellow, the palpi dark brown. Antennæ with the scapal segments dull, brownish yellow, the five or six basal segments of the flagellum yellowish, thence passing into dark brown at the tip of the organ. Head light gray, indistinctly darker medially, the frontal tubercle blackish; vertex with long yellowish hairs inserted in black punctures.

Mesonotal præscutum yellowish with three indistinct, reddish yellow stripes; scutellum and postnotum whitish yellow. Pleura whitish yellow. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters light yellow; femora yellow, passing into brownish at the tips; tibiæ yellow, narrowly dark brown at the tips; tarsi dark brown. Wings yellowish subhyaline, the costal region more saturate yellow; stigma brown; veins brown. Venation: vein *R*₄₊₅ forked, the petiole very short, subequal to the *r-m* cross-vein.

Abdominal tergites dark brown, a little paler caudally; basal sternites yellowish, terminal sternites brown, the segments narrowly ringed with paler on the caudal margins. Hypopygium with the pleurites and appendages dark brown, densely long-hairy.

Female.—Similar to the ♂ but the antennæ shorter; wings relatively very small, semi-atrophied; femora and tibiæ with the dark apices less distinct; valves of the ovipositor powerful, almost straight.

Habitat.—Northeastern United States and Eastern Canada.

Holotype, ♂, Woodworth's Lake, Fulton Co., New York; altitude 1,600 feet; September 2, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 25 ♂ ♀; *paratypes*, ♂, Meach Lake, Quebec, Sept. 2, 1903 (Jas. Fletcher); ♂, Rostrevor, Quebec, Sept. 2, 1907 (A. Gibson); ♂ ♀, Katahdin, Piscataquis Co., Maine, Aug. 22,

1913 (Alexander); ♂, Orono, Penobscot Co., Maine, Aug. 14, 1913 (Alexander); ♀, Roque Bluff, Washington Co., Maine, Aug. 13, 1913 (Morse); ♂ ♀, Ellsworth, Hancock Co., Maine, Aug. 3 to 21, 1913 (Stanwood); ♂ ♀, South Portland, Maine, Sept. 4, 1913 (Alexander); Dug Mt., Hamilton Co., N. Y., Aug. 8, 1912 (Young); Mt. Pinnacle, Fulton Co., N. Y., Aug. 5, 1913 (Alexander); ♂, North Fairhaven, Cayuga Co., N. Y., Sept. 12, 1914 (Alexander); ♂, Grand Island, Erie Co., N. Y., Sept. 6, 1909 (M. C. Van Duzee).
(To be continued.)

BOOK REVIEWS.

BIOLOGIA CENTRALI-AMERICANA. Insecta, Lepidoptera—Heterocera, Vol. IV, Tineina, Pterophorina, Orneodina and Pyralidina and Hepialina (part). By the Right Hon. Lord Walsingham, 1909-1915, London.

Volume IV of the *Biologia Centrali-Americana*, by Lord Walsingham, a most important contribution to our knowledge of the Micro-lepidoptera, has, up to the present time, not been reviewed by any of the entomological journals of the United States or of Canada. This is probably due, not to a failure to appreciate it at its true value, but to the fact that Mr. August Busck, the one best fitted to make the review, of American micro-lepidopterists, assisted in the work of its preparation. The present writer does not intend this to be taken in the sense of a review, but rather as a note of congratulation which may call more general attention to the successful completion of this great work, in which the micro-lepidopterist is more especially interested.

The volume comprises an exhaustive study of the *Tineina*, *Pterophorina* and *Orneodina* of Central America, and includes also a few species of *Pyralidina* and *Hepialina*, as additions to the list given by Mr. H. Druce, in vols. I and II of the *Biologia Centrali-Americana*.

There are listed 1,025 species, 225 genera and 27 families, of which 586 species, 54 genera and 2 families are described as new.

In the majority of instances descriptions of new genera are accompanied by cuts, from drawings made by Mr. J. H. Durrant,

showing the head in profile, and the neurulation of both wings. Ten excellent plates in colour are given portraying 350 species.

The collaboration of three specialists of such recognized standing as Lord Walsingham, Mr. J. H. Durrant, his assistant, and of Mr. August Busck, has resulted in a valuable production which commands careful and respectful consideration.

The conclusion that secondary sexual characters should be discarded, as a means for delimiting genera, while not a new one, as stated by the author, has not won the universal approval that should be accorded it. Lord Walsingham is, therefore, to be congratulated on having been the first to apply this principle in such a comprehensive manner. A list of genera in which these characters are eliminated as a means of generic classification has, of course, led to the sinking of a number of old and well established names as synonyms. Under *Eucosma* Hb., for example, are placed such familiar names as *Epiblema* Hb., *Epinotia* Hb., and *Thiodia* Hb.

The bibliographical work has been done most thoroughly and will make this work indispensable to all who specialize within the groups treated.

Attention is called, by the author, to the necessity for more careful work in the description of neurulation, and to the fact that it is necessary, in most cases, to denude the wing and study it under the microscope. This is undoubtedly true and too much reliance should not be placed upon descriptions based upon older and more inadequate methods. The writer wishes to call particular attention to the helpfulness of the many drawings illustrating the text, and regrets that it was not possible to carry out this plan of illustration for every genus described as new. An adequate verbal description of the neurulation of a new genus, for example, is doubtless possible, but doubtless also it is seldom, if ever, given.

The writer is informed that, by an unusually thoughtful arrangement, drawings of unique types were placed, where specimens of the insects were lacking, with either the British or the United States Museum. This feature has added greatly to the usefulness of the book itself and of the collections of the two museums mentioned.

Lord Walsingham has surely won the thanks of all students of micro-lepidoptera, and especially of those on this side of the Atlantic, for his great and helpful contribution.

CHAS. R. ELY.

CHECK LIST OF THE HEMIPTERA (EXCEPTING THE APHIDIDÆ, ALEURODIDÆ AND COCCIDÆ) OF AMERICA, NORTH OF MEXICO.
By Edward P. Van Duzee. N. Y., New York Entomological Society, 1916.

All Hemipterists will welcome the appearance of Dr. Van Duzee's Check List of North American Hemiptera, as it gives them, at last, a complete list of the species of this order (with the exception of the three families mentioned) found within the territory indicated in the title, and includes their systematic arrangement, full synonymy, the date of each name and roughly the distribution of each species.

Dr. Van Duzee has followed the lines of the Oshanin Katalog of Palæarctic Hemiptera, and has included the results of the latest and best systematic studies dealing with this order. The list begins with the family Scutelleridæ and follows, in reverse order, the system published by Reuter.

The rule of priority has been followed throughout the work, and the synonymy includes that of all the higher group names as well as that of the genera and species. Different types are used for the various grades of group names, the generic and specific appearing in bold-faced type, and the synonyms in italics.

The list gives the names of 698 genera and 2,945 species, and concludes with an index to the generic and higher group names, a feature which greatly facilitates its use.

Dr. Van Duzee is to be highly congratulated on the completion of his invaluable work, and students of Hemiptera and of general and applied entomology will all feel deeply indebted to him and will await with great interest the appearance of the fuller and more complete bibliographical and synonymical catalogue of the Hemiptera, which will be published in the near future.

G. A. M.

THE SARCOPHAGIDÆ OF NORTH AMERICA. *Sarcophaga and Allies in North America*. By J. M. Aldrich. Memoir of the Thomas Say Foundation of the Entomological Society of America. Lafayette. Ind., 302 pp., 16 pls. (Published November 30, 1916.)

This attractive volume constitutes the first Memoir of the Thomas Say Foundation of the Entomological Society of America, and it is peculiarly appropriate that it should be the work of the Editor of the Foundation. At the Columbus meeting of the Entomological Society of America in December, 1915, a standing committee was established under the name of "The Thomas Say Foundation," the purpose of which is "for the publication of works of a monographic or bibliographic character on the insects of North America." The establishment of this Foundation is the outcome of a proposal made to the Society in 1913 by Mr. Nathan Banks. As its success must depend on the financial assistance it receives from those interested in its publications, it is to be hoped that generous support will be forthcoming from all who desire to assist in the production of a series of monographs on American entomology, somewhat similar to the well-known monographs of the Ray Society.

Dr. Aldrich could not have selected a more desirable group for monographic treatment than the Sarcophagidæ. Entomologists have been confronted for some time with the almost hopeless task of identifying the species of this group of flies, the discovery of whose diverse habits has demonstrated how important they are from biological and economic standpoints. The flies are larviparous and the habitats of the larvæ range from decomposing animal substances and excrement, to the bodies of warm-blooded vertebrates. They appear to show an interesting transition from the habit of devouring dead insects to parasitism upon living ones.

Only those who have endeavored to identify the species of *Sarcophaga* will appreciate the difficulty of using the old descriptions, and Dr. Aldrich (and with his work we would couple the excellent work of Dr. R. R. Parker in the same group) has endeavored

to raise what he rightly calls the "virtual blockade" in this group. The chief object of the author has been to make the species recognizable and their determination as easy as possible. To this end he has subordinated the desire so frequently prevalent among certain systematists to create a large number of genera. Had he not been conservative in this respect there is little doubt that no one but the author would have been able to recognize the genera. The author's remarks on this aspect of the subject will find much sympathy among working entomologists. He says: "A survey of the present status of the Muscoid Diptera indicates unmistakably that our great need is not more genera, but a more complete knowledge of species. The tendency of extreme generic specialization is to erect about itself impenetrable barriers of names, as is well illustrated by Desvoidy and Bauer. Genera conceived in this mental atmosphere are likely to be almost wholly subjective creations, which make no impression on the minds of others. The argument that the classification must express the relations has its dangers, partly from the subjective elements involved, and partly from the fact that the classification has also another important function—to provide us with names for our species, which should be as stable as possible if they are to have any usefulness. Furthermore, to separate a species from the genus in which it has been located expresses one relation, that of difference; but it obscures another, that of resemblance, which may be more important. One of the main objects of the present work is to make the identification of species as simple and certain as possible, and thus to attract biological and economic workers to the group. This object would inevitably be defeated by the erection of a considerable number of separated genera. These are the governing considerations which have prompted the preservation as nearly as practicable of the old genus *Sarcophaga*."

The species are separated on the characters of the genitalia which method of separation in this group was first employed by Parker in his study of the Sarcophagidæ of New England. The taxonomic value of the genitalia in different groups of insects, such as Diptera, Coleoptera, Lepidoptera and Mallophaga, is now being clearly demonstrated by different workers, and a valuable and

comparatively simple means of identification is thus being put into the hands of working entomologists.

In this monograph one hundred and forty-five species and varieties belonging to sixteen genera are described. Excellent figures are given of the genitalia in one hundred and thirty-eight cases. The species can be readily divided into eight groups by not restricting the separation to generic characters but by using the most salient and easily recognizable characters that can be found. In a large number of cases the female has not been described, and the author rightly admits the possibility of errors occurring through the identification of females with the wrong males, as few pairs collected *in copula* exist in the collections he has examined, which collections, by the way, include the chief collections of Sarcophagidæ on this continent.

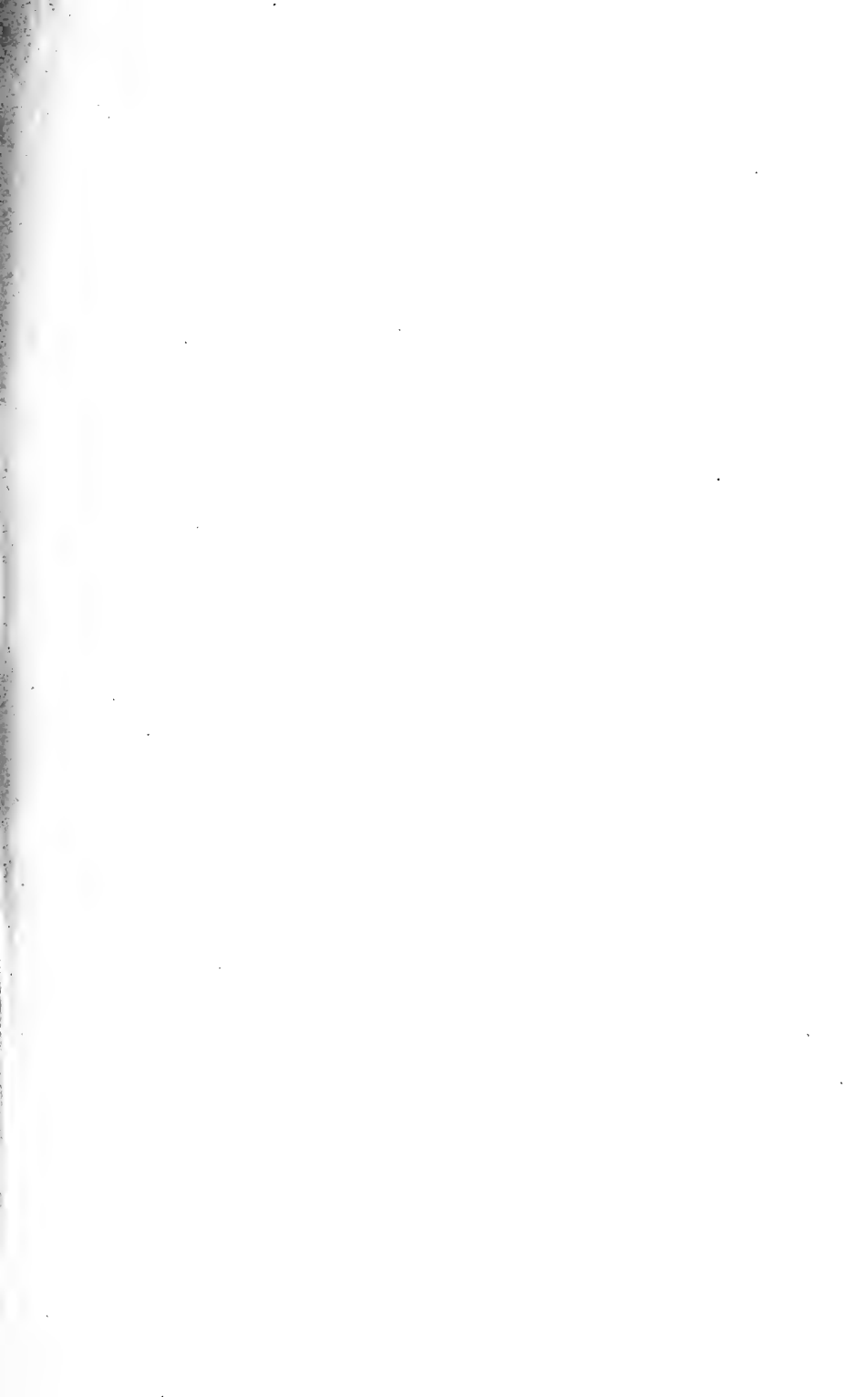
Ninety-five new species are described and several new varieties. Five of these new species and one new variety occur in Canada.

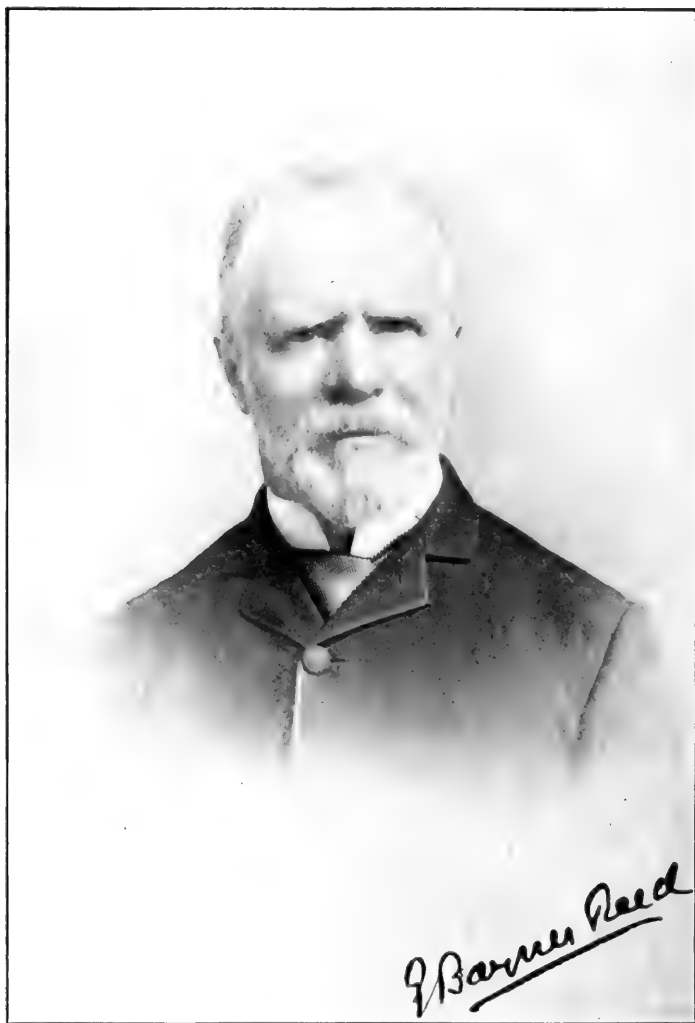
When we remember that in the author's Catalogue of North American Diptera, one hundred and six nominal species of Sarcophaga were listed and that hardly more than half a dozen of these had been described in a manner that would permit recognition, the extent of our indebtedness to him for this contribution will be readily appreciated. He has placed both systematists and economic workers under a debt of gratitude for his painstaking work which will undoubtedly stimulate others to study this group of flies, the investigation of whose habits is rapidly disclosing the economic importance of the group.

We cannot conclude this review without remarking on the excellent manner in which the monograph is printed and bound, and we hope that this standard will be maintained in future volumes of this series. It is unfortunate that in the author's desire to make the work immediately available, a number of typographical errors have been overlooked, and we think that the inclusion of an outline sketch of *Sarcophaga* would have added to the value of the introductory description.

C. GORDON HEWITT.

Mailed January 24th, 1917.





EDMUND BAYNES REED.

Original member of the Entomological Society of Ontario, 1863-1916.

The Canadian Entomologist.

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No. 2

EDMUND BAYNES REED.

Few of the present members of the Entomological Society of Ontario have any knowledge of the pioneer work which was done more than half a century ago by a small band of enthusiastic entomologists. Very few of those who joined in its organization on the 16th of April, 1863, survived to witness its Jubilee three years ago; among these were Mr. Edmund Baynes Reed, and now he has in his turn been removed by death after a long illness due to heart trouble. He died at Victoria, B.C., on Saturday, November 18th, in the 79th year of his age.

Mr. Reed came to Canada from England when a young man and settled in London, Ontario, where for some years he practiced his profession as a lawyer. The kind of work it entailed was not very congenial to him, and was consequently abandoned.

As a devoted member of the Church of England, he took a keen and active interest in its concerns, and became Secretary-Treasurer of the Synod of the Diocese of Huron—a position which he continued to hold until his removal to British Columbia in the year 1890.

From his boyhood days in England he was devoted to Natural History, and especially to the collection and study of insects. To these pursuits he devoted most of his leisure hours, and when the Society was formed he became one of its most energetic and useful members. To him was chiefly due the establishment of the library which is now one of the most valuable of the kind in the Dominion. In co-operation with Dr. William Saunders he was instrumental in forming the London Branch of the Society, which grew and flourished for several years and was finally absorbed by the parent Society when its headquarters were removed to London. When it was decided to send a representative collection of Canadian insects to the Centennial Exhibition in Philadelphia in 1876, Mr. Reed devoted all his spare time during many months to its prepara-

tion and contributed the whole of his collections. He was Secretary-Treasurer of the Society in 1871 to 1873 and from 1880 to 1886; member of the Council from 1874 to 1876; Vice-President in 1874, 1877 and from 1887 to 1889; and during most of these years Curator and Librarian as well.

The following extract from the report of the Council for the year ending August 31st, 1890, is a well-merited appreciation of the many services that he rendered to the Society: "The Council desire to place on record their feelings of deep regret at the removal of Mr. Reed from this Province and the loss which the Society thereby sustains. Mr. Reed is one of the original members of this Society, and for more than a quarter of a century has been one of the most active and zealous of its officials, filling at different times the positions of Vice-President, Secretary-Treasurer, Librarian, Curator and Auditor. To him it is especially due that the Library has grown to its present dimensions and value, and that so much progress has been made by the Society in many directions. The Council beg to thank Mr. Reed for his services in the past, and wish him all possible success and prosperity in his new and important sphere of labour."

When the Society was called upon in 1870 to make its first Annual Report on insects in relation to agriculture and fruit-growing, Mr. Reed joined with Dr. Saunders and Dr. Bethune and contributed the article on "Insects affecting the Plum;" a further article in continuation of the same subject was published in the Second Report, and also papers on "Insects injurious to the Potato," and "Insects attacking the Cucumber, Melon, Pumpkin and Squash." His further contributions to the annual reports were "Insects affecting Maple Trees," "Insects affecting the Peach," and addendum to the "Insects injurious to the Potato" (3rd Report, 1872); "On some common insects which affect the Horse, the Ox and the Sheep" (4th Report, 1873); "Entomological Contributions: The Io Moth, the Flat-headed Apple-tree Borer and the Locust-tree Borer" (5th Report, 1874); "Sphingidæ—Hawk-moths" (12th Report, 1881); "Diptera—Two-winged Flies" (13th Report, 1882); and a number of short notes in several of the volumes. He also prepared a useful Index to the first thirteen Reports 1870-1882, a pamphlet of 35 pages.

Mr. Reed was also a constant contributor to the Canadian Entomologist. His articles related chiefly to the Lepidoptera and included descriptions of larvæ, records of rare captures, collecting notes, and popular papers on various common insects. He was equally interested in both systematic and economic Entomology.

Though specially devoted to the study of insects, he was for many years engaged as an amateur in taking meteorological observations. In co-operation with the Observatory at Toronto, he installed the necessary apparatus, using the tower of the Cathedral for his anemometer and vanes, and connecting them with his house which was near by. His records were so accurate and satisfactory that he was selected to take charge of a newly-established Observatory at Victoria, British Columbia, to which place he removed in 1890 and there remained for six and twenty years—respected by all who came in contact with him and beloved by his friends.

During Mr. Reed's residence in London the writer had the pleasure of intimate friendship with him, and often enjoyed his hospitality when attending the Annual Meetings of the Society. He was always an agreeable and sympathetic companion, merry and vivacious, cheerful and happy hearted. Since his removal to the distant Pacific Coast, the friendship has been maintained by correspondence in default of ever meeting; his last letters related to the celebration of the Society's Jubilee, in which he was deeply interested.

C. J. S. BETHUNE.

POPULAR AND PRACTICAL ENTOMOLOGY.

ON THE PORTRAIT OF A WOLF SPIDER.

BY CHARLES MACNAMARA, ARNPRIOR, ONTARIO.

The number of species of insects and their allies in the world is a frequent subject of discussion among entomologists, and it may be remarked that writers differ a good deal on the question. But I have never come across any attempt at a general insect census. Doubtless the numbers are too appalling, and the would-be enumerator must shrink aghast before the frightful superabundance of invertebrate life. To count the stars of the Milky Way would be

easy compared with numbering these little creatures. If the task were attempted, the ordinary units of our decimal notation would be found useless, and our only hope would be to adopt some vast measure like the "light-years" of the astronomer. But if we cannot even guess at the number of individuals in these lower forms of life, we may at least form some rough estimate of the *relative* abundance of the various orders and like divisions.

But here again there are likely to be decided differences of opinion. There is such a tremendous flow and ebb in the tide of "insect" life—using the term in its wide, popular significance—that it is not easy to infer which kind is really in the majority. Speaking of conditions in this country, the student of pond-life must be persuaded that at certain times of year there are more *Daphnia* and *Cyclops* and other minute crustaceans in his pools than any other form of *Arthropoda* in the district. Again sometimes lepidopterous larvæ, such as the tent-caterpillar and the army-worm, seem to outnumber all other insects. May-flies and grasshoppers also appear on occasion in immense numbers. The minute springtail, too, must not be forgotten, for certain species of this family sometimes emerge in winter in such abundance as to blacken the snow over considerable areas. Mosquitoes are quite as plentiful as anyone could desire, but we are perhaps apt to over-estimate their importance in the numerical scale on account of their obtrusive manners which force them unduly on our attention, and the same is true of the house-fly. But I was long convinced that ants must hold the record for numbers of individuals, for anyone who has collected them must have been struck by their wide distribution and their great abundance. They are to be found simply everywhere: in dense woods, mossy swamps, dry, open fields, rocky hills, and hot, sandy beaches. The sacred dwelling of man himself is seldom exempt. One or other species of the *Formicidæ* adapts itself to these most varied habitats, and flourishes in all.

However, I recently changed my opinion on this point. In the course of a forty-mile drive on the first of October last through parts of the counties of Renfrew, Lanark and Carleton in Ontario, I was fairly astounded at the evidence of the numbers of spiders there must be in the country. Our road lay mostly through culti-

vated land, and everywhere over the tens of thousands of acres we passed were laid the gossamer threads of spiders, so thickly set that I doubt if one could have placed as much as a finger tip anywhere in the fields without touching several strands of the webs. Every tall weed and every fence streamed with the threads, and towards evening the rays of the westering sun were reflected from the shimmering fields like moonlight on a lake. All this was the work of so-called gossamer spiders, formerly thought to be a distinct kind but now known to include the young of many different species. The number of individuals necessary to produce the wonderful effect must have been stupendous indeed, for our drive did not circumscribe the area thus affected, and no doubt the same condition obtained for many miles around our course.

Spiders are always connected in the popular mind with the spinning of webs and snares to catch the unwary fly, but a great many species resort to no such subterfuge. Of course, all true spiders can spin, but many use their silk only for the manufacture of egg-bags or to line their burrows, or as a life-line by which they can drop from danger or save themselves from a fall. Chief among those that spin no web may be mentioned the Attids or Jumping Spiders which leap on their victims unawares; the Thomisids or Crab Spiders that lie in wait in flowers to seize insects that come in search of nectar; and the Lycosids or Wolf Spiders, exceedingly active runners, that hunt down their quarry in much the same manner as their mammal namesakes. Of these three families the Wolf Spiders are by far the commonest, and are found everywhere in great variety. The original of the accompanying "portrait" belonged to a rather small-sized species numerous inhabiting a sandy beach on the shores of the Ottawa River near Arnprior. The claw terminating the palp shows this specimen to be a female, for the palps of male spiders end in a curious knob-like organ. This species, which is a typically swift runner, is thickly clothed with very fine, light brown hair, with darker markings—it might almost be called a "fur"—a coloration well calculated to conceal it in its sandy habitat. Indeed, I seldom saw one of these spiders on my frequent visits to this spot during the summer, but one day in the late autumn I noticed the surface of the beach dotted with scores of tiny heaps of fresh, damp sand. On investiga-

tion each of these was found to close the mouth of a vertical tunnel twelve to eighteen inches deep, at the bottom of which was a torpid spider of this species, evidently retired for the winter. Obviously the spider population of the beach was much greater than I had suspected.

Keeness of vision is as necessary to the wolf spider as agile limbs, and so it is well provided with eyes, which are, too, much better developed than those of the snare weavers that depend largely on their sense of touch to acquaint them of the approach of their prey. Apparently the "Wolf" can see in every direction, above, before and behind. On the front of its head a row of four small eyes surmounted by two larger ones inform it of happenings before it and to either side, while two other large eyes on the top of the head are directed upwards and backwards. The powerful jaws, armed with a pair of needle-sharp fangs, each grooved with a poison duct, are almost hidden by the long hair covering them. She has indeed a repulsive countenance. We are often told of the beauties revealed by the microscope. In this case it is a horror that has been disclosed. But the race is not always to the swift nor the battle to the strong, for with all her panoply, this redoubtable spider was overcome by an antagonist more terrible yet, as I will relate.

One day in early September when seated on a log at my favorite beach, and taking a quiet entomological survey of the surroundings. I suddenly caught sight of an extraordinary many-legged insect buzzing rapidly across the sand towards me. A second glance resolved the anomaly into a digger wasp dragging with it a wolf spider which it had paralyzed with its envenomed sting, and was carrying to its nest to provide fresh food for its future larvæ. The wasp's shallow, sloping tunnel was in the sand close to my feet, and she quickly pulled her prey within. I waited some time in vain for her to emerge, and then dug up the nest. The wasp escaped with a whirr of wings but the wretched spider, although alive, was incapable of movement of any kind, and remained inert in my hand. Commiserating a spider caught at its own rapacious game is something like wasting pity on the incinerated crew of a baby-killing Zeppelin, but I could not help feeling sorry for this erstwhile lightning runner of the sands doomed never to move its swift limbs

again. Here, however, was an excellent and unusual opportunity to secure a photograph of a wolf spider. For the living, uninjured Lycosid is so nimble and nervous that it is a most difficult matter to photograph it successfully, while it is very hard to "set up" the dead spider properly. So I carefully carried my spider home.

Here a few concise, technical notes may be of interest to the photomicrographer. The negative of the accompanying photograph was made with an ordinary whole plate view-camera provided with both front and back focussing. A half plate or even quarter plate camera would have served equally well or better, but no smaller instrument of sufficient extension was available. The lens used was an Aldis photomicrographic anastigmat of 2 in. focus, an admirable little lens of moderate price that can easily hold its own with much more expensive objectives. My camera and object stand is a home adaptation of the swinging frame of the photo-engraver. It consists of a board 4 ft. long by 14 ins. wide swung by cotton ropes at the four corners from two light trestles about 3 ft. high, and is a device I find very useful to avoid vibrations during long exposures.

At one end of the board is a narrow, longitudinal slot, one foot long, through which a bolt with a wing nut fastens the camera firmly at any position along the slot. As the object must be placed very close to a lens of such short focus, if the latter is mounted in a lens board in the ordinary way, the shadow cast by the relatively large camera front is sure to cause trouble. To obviate this I have the lens mounted at the truncated apex of a copper cone, 3 ins. long, the base of which, $2\frac{1}{2}$ ins. in diameter, screws into a lens flange attached to the usual lens board which fits the camera front. A stand was made for the spider with several small blocks of wood, about 8 in. x 3 in. x 1 in. thick, piled up like steps of stairs. On these, by means of dark-room pins, was fastened a curved piece of smooth, white paper, with its top sloping away from the lens. The middle of the curve formed a little shelf just opposite the lens, and on this the spider was placed. This arrangement offered a plain background, and a shadowless support on which the spider was carefully posed, her limbs and palps being put in position with a couple of botanical needles.

The illumination used was daylight, the whole apparatus having been set up in a large bay window looking north. A camera extension of 18 inches was employed, which, with the 2-inch lens, gave an image enlargement of 8 diameters. The ground glass of the camera is provided with a clear spot in the centre, and on this the image was critically focussed with the aid of a focussing magnifier. The lens was stopped down to f.45 to gain the necessary depth of field, and the required exposure was calculated with a Watkins exposure meter, the normal time, as shown by the meter, being multiplied by the square of the magnification, in this case 64.

The plate was a Wratten & Wainwright backed panchromatic, but as it was used without a screen, any good ortho plate would have given much the same result. It is customary in photographic data to mention the developer, but for ordinary negative work there is no essential difference between the many developers on the market, and one should always use the solution one is accustomed to. Personally, I admit a preference for the well known "B. J." pyro-soda, and with this the spider negatives were developed. Several exposures were made of different views of the spider, and thanks to the excellent lens and small stop, all the negatives turned out so sharp and with such good depth of focus that they can be enlarged to any reasonable size. In fact I have enlarged the "portrait" to 75 diameters, and only stopped at that size for want of a larger sheet of bromide paper. The image would not be unduly soft at 150 or 200 diameters.

The spider proved a most amenable sitter, and would remain motionless for an indefinite time in any position she was put in. But if the poison of the wasp had fettered her limbs, it had not tamed her ferocious spirit, for I can read a felonious glare in those nightmare eyes.

After photographing her, I kept her under observation in a pill box to see if the effects of the wasp's sting would wear off. After about a week the paralysis seemed to be passing, and she began to make a few constrained movements. I hoped, if she recovered, to set her free once more on her native beach. But who can escape his fate? The very steps we take to avoid our destiny lead us irresistibly towards it. This spider's doom was to be eaten alive by a wasp larva, and it found her even in the pill box; my



PORTRAIT OF A WOLF SPIDER.

(Page 39)

intervention availed nothing. One day I opened the box as usual, and to my surprise found therein a small voracious grub which had already devoured about half of the hapless Lycosid. I had carried none of the wasp's nest material from the beach with the spider, and although I am told that these wasps are not known to attach the egg to the food supply, I can only suppose that in this case the egg was in some way fastened to the victim, and when it hatched out the grub began work at once on the food supply provided by the marvellous instinct of its mother. Next day there remained only the scattered legs of the spider, and a couple of days later, the grub itself, pining for the "optimum" conditions of its sandy nest, died also.

INSECTS IN OCEAN DRIFT.*

I. HEMIPTERA HETEROPTERA.

BY H. M. PARSHLEY, BUSSEY INSTITUTION, HARVARD UNIVERSITY.

Insects cast up by the waves are often found on the shores of bodies of fresh and salt water, as is well known to most collectors. Specimens found in this way are usually few and scattering, and their presence in the water is probably due simply to an unusually venturesome flight which may have carried them too far for a safe return to land. On rare occasions, however, much more extensive flights may occur, with the result that the shipwrecked are cast ashore in unbelievable numbers, sometimes forming a windrow for miles along the beach. This phenomenon is not to be explained in connection with the spring and fall flights when the air seems alive with insects on the wing, as it has been observed at various other seasons, and for the same and other reasons such flights do not appear to be nuptial in character. Sometimes a violent off-shore wind has been held accountable for the presence of the insects in the water, but this explanation will not fit the cases which I have observed; in fact, no satisfactory hypothesis has been advanced as yet. As a knowledge of the species concerned is important in the explanation of insect activity, I append a list of the Hemiptera Heteroptera which I have taken in ocean drift, leaving the list of the other groups for a later paper.

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 123.

February, 1917

For several years I have spent the summer at Beach Bluff, Mass., during which time I have seen the phenomenon under discussion on only three occasions, each time in the afternoon: June 21, 1915, July 18, 1915, and Aug. 1, 1916. In each case there was a light on-shore breeze with fair weather, and in none was the occurrence preceded by an unusually violent off-shore wind, though on the day before the last a moderate land breeze was observed. The insects were not washed up in such enormous numbers as in the cases reported by Needham,* where the shore was blackened by them for miles, but nevertheless the stranded insects were very numerous, in some places forming a continuous line along the beach. The occurrences which I observed were remarkable for the large number of different species represented, with relatively few specimens of each, unlike some of the previously reported cases where the flotsam consisted largely of a single species in enormous numbers. As noted by J. R. de la Torre Bueno in his paper on the subject,† the collector finds in beach drift many species whose retiring habits ordinarily save them from capture, and in the following list are a number whose presence in the vicinity I had not suspected. All the specimens recorded below were taken from the sand immediately on being left by the waves, and I can thus vouch for the fact that all actually took part in the flights over the water. Those marked with an asterisk are mentioned in the list of ocean drift Hemiptera given by Bueno.

LIST OF SPECIES.

Scutelleridæ.

Eurygaster alternata Say, July 4, 1915.

Cydnidæ.

Thyreocoris ater A. & S., June 21, July 18. (2)

T. nitiduloides Wolff., June 21.

T. pulicarius Germ., June 21, July 18. (6)

Pentatomidæ.

**Podops cinctipes* Say, June 21.

**Mormidea lugens* Fab., June 21, July 18. (2)

Dendrocoris humeralis Uhl., July 18.

* Insect Drift on the Shore of Lake Michigan, Occas. Mem. Chicago Ent. Soc., vol. 1, No. 1, 1900.

Beetle Drift on Lake Michigan, Can. Ent., vol. 36, 1904, p. 294.

† Heteroptera in Beach Drift, Ent. News, vol. 26, 1915, p. 274.

Perillus exaptus Say, June 21.

**Apateticus cynicus* Say, July 18.

**A. bracteatus* Fh., Aug 1.

Lygaeidæ.

**Lygæus kalmii* Stal., July 18.

Ortholomus longiceps Stal., July 18.

**Nysius ericæ* Schill., June 21.

**Ischnorrhynchus geminatus* Say, Aug. 1.

Cymus angustatus Stal., July 18.

C. discors Horv., June 21.

Geocoris bullatus Say, June 21. (6)

G. bullatus discopterus Stal., June 21. (2)

G. uliginosus speculator Mont., July 18. (3)

G. uliginosus limbatus Stal., June 21. (4)

**Ligyrocoris diffusus* Uhl., June 21, Aug. 1. (10)

Rhyparochromus plenus Dist., July 18, Aug 1..

These specimens seem to agree with the description and figure given by Distant in the *Biologia Centrali-Americana* of a form from Guatemala, but there is some question in regard to the generic reference. I have seen a specimen from Mt. Tom, Mass., and others have been found at Georgetown, Conn., and in the Huachuca Mts. Ariz. For most of this information I am indebted to Mr. H. G. Barber, who spares neither time nor trouble when called upon for assistance in some difficult question relating to the Hemiptera.

**Eremocoris ferus* Say, June 21, July 18. (11)

Piesmidæ.

Piesma cinerea Say, June 21.

Not found heretofore north of Rhode Island.

Tingidæ.

Corythucha marmorata Uhl., July 18.

C. sp. nov., June 21.

The description of this and several other new species of *Corythucha* will be published elsewhere.

C. cratægi Morrill, Osb. & Drk., Aug. 1.

Melanorhopala obscura Parsh., (Psyche, Vol. 23, 1916, p. 167) June 21.

Nabidæ.

**Nabis ferus* Linn., July 18.

Miridæ.

Miris dolabratus Linn., June 21. (2)

Platytylellus sp.?, June 21.

Neurocolpus nubilus Say, Aug. 1.

Pæcilocapsus lineatus Fab., July 18.

Capsus ater Linn., June 21. (4)

C. ater semiflavus Linn., June 21.

Camptobrochis grandis Uhl., July 18. (7)

Gerridæ.

**Gerris marginatus* Say, July 18. (4)

Saldidæ.

Saldula major Prov.

S. pallipes Fab., July 18. (2)

S. sphacelata Uhl., June 21.

S. opacula Zett., July 18.

S. sp.?, June 21, Aug. 1. (3)

**Micracanthia humilis* Say, June 21, Aug. 1. (9)

Some of these were taken under seaweed where they were very numerous on Aug. 1, though not so ordinarily. Stranded specimens were very active as soon as they left the water, and probably those under the seaweed had taken temporary refuge there after escaping the waves.

Corixidæ.

Corixa verticalis Fieb., July 18. (2)

Kindly identified by Prof. J. F. Abbott.

It is well known that some insects can withstand prolonged submergence in salt water, but from the condition of the more fragile species, many of which gained the shore alive, it seems to me probable that the flights occurred on the same day, shortly before the insects were washed ashore. If this be true, a possible explanation of the flights presents itself. On a clear day with a light, on-shore breeze the surface of the ocean reflects the sunlight with a peculiar sparkling brilliancy which might conceivably attract insects already flying above the land in unusual numbers because of some favouring combination of atmospheric conditions. The absence of the latter factor would account for the lack of a flight on days which were otherwise favourable. Thus, a light, on-shore breeze rather than a strong, off-shore wind may be the more frequent cause of the flight of insects over the water, and their consequent presence in the drift.

THE CALIFORNIA SPECIES OF MYZUS, WITH THE
DESCRIPTION OF A NEW SPECIES.

BY G. O. SHINJI, BERKELEY, CALIFORNIA.

The following species of *Myzus* have been collected by the writer in the vicinity of the University of California during 1915.

1. *M. cerasi* (Fabr.). Taken from curled leaves of cultivated cherry (*Prunus cerasus*) within sixty feet of the University of California campus.

2. *M. circumflexum* Buckton. Found on following plants: *Vinca major*, *Solanum tuberosum*, pansy, *Ceanothus* sp., *Stachys bullata*, *Plantago* sp., *Senecio nickanioides*, *Solanum nigrum*, *Fuchsia* sp., wall flower (*Cheiranthus cheeri*), lilies, iris, gladiolus, *Nasturtium* sp., water cress, foxtail, *Cerastium viscosum*, buck-eye (*Æsculus californica*), *Sisymbrium* sp., *Viola* sp., *Symphoricarpos racemosus*, Boston ivy, *Digitalis*.

3. *M. rosarum* Walk. Taken on wild and cultivated roses.

4. *M. rhamni* Boyer. Taken from leaves, stems and berries of California coffee-berry tree (*Rhamnus californica*) and also *Cascara sagrada*.

5. *M. ribis* (L). Collected from under side of leaves of wild gooseberry, University of California campus, April 10, 1915.

6. *M.* sp. This species will be named by Professor Essig. Host plant *Aquilegia vulgare* and *A. truncata*. Date of collection, April 20, 1915, Berkeley, and also May 20, 1915, Inverness, Marin County, California.

7. *Myzus godetiae*, n. sp.

Alate viviparous female.—General colour light green. Length of body 1.6 mm. Width of abdomen .7 mm. Wing expansion 3.9 mm. Head broader than long, dusky, eyes dark red. Antennæ arising from prominent frontal tubercles, dusky. Length of antennal joints: III, .5 mm.; IV, .3 mm.; V, .2 mm.; VI, .1 mm.; Spur .4 mm. 10-12 sensoria on III. Prothorax dusky, broader than long, wider than head. Thorax dusky, width .7 mm. Legs with apical two-thirds and one-third of tibia dusky, remaining parts green. Abdomen green with large median dorsal patches or rows and also marginal dots of black. Cornicles dusky to black,

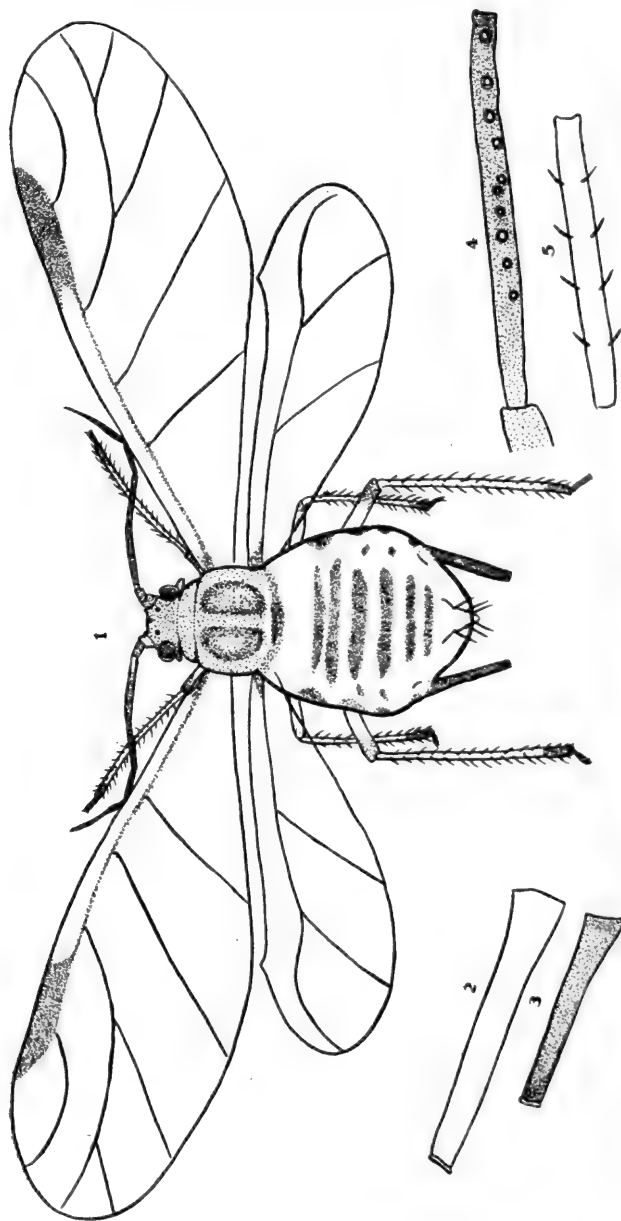


Fig. 4.—*Mysis godeletii*. 1, alate viviparous female; 2, cornicle of apterous viviparous female; 3, cornicle of alate viviparous female; 4, second and third antennal articles of alate viviparous female; 5, same of apterous viviparous individual.

.4 mm. long, decidedly tapering toward the distal end. Style somewhat conical, slightly dusky.

Apterous viviparous female.—General colour green. Length of body 1.6 mm. Width of abdomen .7 mm. Head green, broader than long. Eyes dark red. Antennæ situated on frontal tubercles, green with sixth including filament and also apical half of fifth, dusky. Rostrum beyond second coxa, tip dusky. Thorax and abdomen green. Legs green, with apices of tibia and tarsal joints dusky. Cornicles green, slightly swollen near apex, .5 mm. long. Cauda green, conical.

Host plant—*Godetia amæna* (Lehn.). Lilja?

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 4, 1915.

A NEW SPECIES OF AMPHROPHORA FROM CALIFORNIA.

BY G. O. SHINJI, BERKELEY, CAL.

Amphrophora cicutæ n. sp.

Alate viviparous female.

Slightly smaller than *A. rubi* Kalt. General colour light green or pale. Length of body 3 mm. Width of abdomen 1.15 mm. Wing expansion 5.4 mm. Head pale, broader than long, width between the eyes .45 mm. Beak reaching second coxa, tip dusky. Antenna situated on prominent frontal tubercles, slightly dusky, more intensely so at the joints and apex of VI and spur. Length of antennal joints: III, 1.1 mm.; IV, .9 mm.; V, .64 mm.; VI, .25 mm.; spur 16 mm.; III with about 18 sensoria in a row. Prothorax with a small tubercle on each side, nearly as wide as head, broader than long, width .6 mm., slightly dusky, especially when viewed from side. Meso- and metathorax slightly dusky. Width of mesothorax .8 mm. Abdomen pale, with small, red spots scattered throughout. Legs moderately long, tarsi and apical portion of tibia dusky, the rest the colour of the body. Cornicles swollen beyond the middle, tip dusky, the rest the colour of the body. Length 1.1 mm. Style pale, .45 mm. long.

February, 1917

Apterous viviparous female.

Light green or pale according to niches. Length of body 2.6–3.4 mm. Width of abdomen 1.2 mm.–1.7 mm. Eyes dark red. Beak reaching third coxa, tips dusky. Antenna situated on frontal tubercles, apices of III, IV, apical half of V and VI including spur dusky, rest pale or green. Head, thorax and abdomen light green or pale. Legs colour of body except tarsi, which are dusky. Cornicles colour of body, swollen beyond middle, length .7–9. mm. Style moderately long, colour of the body.

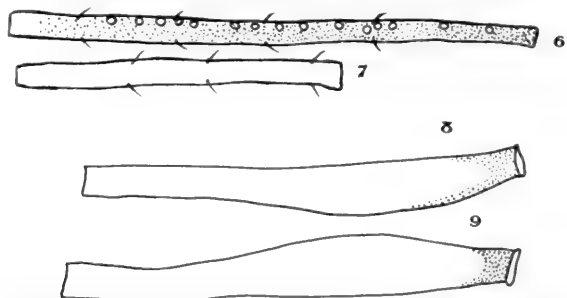


Fig. 5.—*Amphrophora cicuta*.—6, third antennal articles of alate viviparous female; 7, third joint of apterous viviparous form; 8, cornicle of alate, and 9, cornicle of apterous female.

Host plant.—*Cicuta virosa* var. *californica*.

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 20, 1915.

Notes.—This species is nearer to *A. rubi* Kalt. than *A. latysiphum* Davdn. It differs from *A. rubi* in the following characters: (1) Spur with its base longer or at least as long as V plus IV or III plus V. (2) Sensoria on III about one-half as many as in *A. rubi*. (3) III of apterous forms without or with fewer sensoria. (4) Shape, size and coloration of cornicles.

The following numerical data, obtained with the writer's collection of *A. rubi* Kalt. at the same date and locality, may be of use for comparison:

A. rubi Kalt.—Length of antennal joints of alate form: III, 1.2 mm.; IV, .7 mm.; V, .6 mm.; VI, .2 mm.; spur, 1.3 mm. Length of body 3.5 mm. Width of abdomen 1.4 mm. Width of prothorax .7 mm. Sensoria on III 35–45.

Host plants.—Wild and cultivated blackberry.

OBSERVATIONS ON THE LIGHT-EMISSION OF
AMERICAN LAMPYRIDÆ:

THE PHOTOGENIC FUNCTION AS A MATING ADAPTATION; 5th PAPER.

BY F. ALEX. MCDERMOTT, WASHINGTON, D.C.

The following paper embraces the results of some observations made since the fourth paper in this series was published. (See Canadian Entomologist, 1910, vol. 42, p. 357; 1911, vol. 43, p. 399; 1912, vol. 44, p. 73; 309.)

1. *Pyractomena borealis* Randall. (*) The presence of this species in the neighbourhood of Washington, D.C., was established by Mr. W. S. Fisher, who found it pupating in large numbers in deep crevices in bark at Great Falls, on the Potomac River, about fifteen miles northwest of the U. S. Capitol at Washington. It is quite a large Lampyrid, and its flash appeared to the writer to be the brightest of any of the known local fireflies. When flying at a height of from eight to ten feet above the ground, its flash produced a distinct though faint illumination over an area perhaps ten feet in diameter on the ground.

The distribution of the luminous organ in this species is very similar to that in *P. angulata* and *P. lucifera*. In the male, the entire ventral surfaces of the two segments before the last show the yellow colour of the luminous tissue, while in the female this tissue area is restricted to two irregular patches on these segments. The male should, therefore, give distinctly the brighter light. The habit of the insects of pupating in crevices in bark several feet from the ground, as observed by Fisher, together with the known reluctance of many female lampyrids to fly, even when possessing wings, would make it seem probable that the females would be found on the bark of the trees where they emerged, or not very far away.

* In a former paper the writer adopted the late E. Olivier's name *Lecontea* for this genus. Olivier's reasons for the change, however, appear to be invalid, according to Rule 36 of the International Commission on Zoological Nomenclature. As a matter of interest it may be mentioned that Mr. H. S. Barber, of the U. S. National Museum, calls my attention to the fact that the name *Pyractomena* was originally applied by Dejean (1833) to a genus containing only manuscript names of species. Leconte, in 1850 applied this generic name to *Lampyris borealis* Randall, a described species, which therefore automatically became the type for this genus. This publication antedates that usually given, Leconte, 1852. The other species, *lucifera* and *angulata*, are correctly placed in this genus.

The writer's observations on this species were made at Great Falls, over the same area where Fisher had found the species, and on the evening of May 3, 1916, several days after Fisher's observations. The insects did not appear until it was quite dark—about 8.00 p.m.—when numbers of them were seen along the top of the bluff, some forty or fifty feet high, which marks the former river bank at this point. On ascending this bluff, the insects were found to be flying around in the foliage, principally from ten to twenty feet above ground, flashing at intervals of five to ten seconds; they soon became very plentiful. At first their flight appeared to be entirely aimless, and even long and close watching failed to reveal any replies to the flashes from females on bark or twigs, but presently a fainter occasional flash was observed on a trunk about 8 feet above ground, where the brighter flashes of the males had already been observed. It soon appeared that the fainter flash emanated from a point between two males, each of the latter some six or eight inches from the faint flashes. An electric flashlight revealed an imago of this species on the bark, but just out of reach; it cannot be stated positively that this was a female, but the conduct of the faint flashes points strongly in that direction, as the fainter flash was several times observed to follow closely flashes from one of the two males; it did not follow all of these flashes, which may have been due to the irregularities in the bark hiding the flashes of the male at times. The males, as was found later, on alighting near a supposed female, run fairly rapidly over the area, apparently in search of her. In this case, the male lower down on the bark was captured and identified. They were still flying and flashing an hour after the first observation, apparently as thickly as at first, this conduct resembles *Photuris* more than *Photinus*—indeed, except that the light is not quite as green to the writer's eye, the flight of this species suggests that of *Photuris*.

The flash of the male is a single, rather short and intense flash, followed in many instances, though not in all, by a very faint, slow or "trailing" secondary flash. This secondary flash varied greatly with different individuals, being in some cases so distinct as to suggest the double flash of *Photinus consanguineus*, while in other specimens it was apparently absent. The males, when approaching a supposed female, usually, though not always, exhibit a faint,

continuous glow between flashes. The flash of the female—if this may be judged by the specimen seen on bark and assumed to be a female—is a much less intense and slower flash, given almost immediately after the flash of the male she is answering. Representing these in the manner used by the writer in his review of this subject (*Zeitschrift für wissenschaftliche Insektenbiologie*, 1914, Bd. 10, pp. 303–307), the flashes of this species would appear as shown in the sketch, Fig. 1.

Experiments with a pocket flashlight soon showed that the flying males would pay no attention to the unshielded light, when flashed immediately after their flashes (although the toads in the neighbourhood seemed greatly interested, and could be heard hopping toward the experimenter from several directions after each flash!) When, however, the fingers of the free hand were so disposed over the bulb as to completely prevent the escape of any direct light, the luminous surface being the portion of the finger tissue through which the light passed, it was found easy to attract flying males from a distance of as much as twenty-five feet, by flashing immediately after the flash of the male. The reaction was so definite as to leave no doubt of the matter; of ten males captured in perhaps fifteen minutes, nine were obtained as the result of attraction to the experimenter by means of the flash light. For instance, a male was observed to be flying in a direction about at right angles to the path which the experimenter was following, and about fifteen feet ahead and perhaps twenty feet in the air. Immediately after he flashed, the shielded lamp was flashed; the flying insect immediately turned, flying downward and along the line of the path, almost in a direct line for the experimenter's hand. Each time he flashed, the flash was answered, as he drew nearer, and when quite close, he swerved suddenly and alighted on the coat sleeve of the extended hand. One or two of those taken were caught in flight, but most of them were allowed to alight on the coat sleeve, and then captured; they usually landed at a distance not more than about eight inches from the light, running around rather rapidly after lighting, stopping occasionally and waving the antennae somewhat after the manner of *Photinus pyralis* when mating. It is interesting to note that the distinctly red colour of the light from the flash light after passing through the tissue of the experi-

menter's fingers, did not seem in the least to interfere with the phenomenon, although decidedly different from the colour—to the human eye—of the light of the female insect.

A flash of a flying Lampyrid, closely resembling that of the male of this species, was observed by the writer in the Soldier's Home Park, in Washington, D.C., about April 20, 1911, and was at that time ascribed by Mr. H. S. Barber, to some northern species not yet recorded from this locality. The distribution of *P. borealis* in the surrounding country has not been worked out, but it would appear possible that the flash seen in 1911 might have been due to a chance male of this species. The spring of that year was rather warmer than usual, possibly accounting for the early date.

Olivier (Accouplements anormaux chez les insectes. Premier Cong. Internat. d'Entomologie, 1910, pp. 143-145; see also Gadeau de Kerville, Bull. Soc. Ent. France, 1896, No. 4, p. 85) has mentioned the comparative frequency with which two male lampyrids are found attempting to mate. During this investigation a number of live males of *Pyractomena borealis* were placed in a test-tube, and upon examining them about half an hour later it was found that two of them had coupled, the penis of the upper one being held between the mandibles of the other; they remained in this position at least two hours. The position of the terminal segments of the upper male were those of normal intromission. There was no evidence that one insect had attacked the other, nor did either appear to be injured.

It may be noted that the odor of this insect, while resembling that of *Photinus pyralis*, is still rather different from that of the latter species.

2. *Photuris pennsylvanica* DeGeer. This species was observed for the first time during the season of 1916, along the Conduit Road between Great Falls and Cabin John Bridge, on the evening of May 27. The insects first appeared as isolated, scattered specimens about 8.15 p.m., but by 9.00 o'clock there were thousands of them flashing in the trees and over the fields. As previously noted (Can. Ent., 1911, vol. 43, pp. 403-4) difficulty had been experienced in connecting the luminosity with the mating conduct in this species. Experiments with the use of the electric flash light

were begun on the above date, using both the naked bulb and the bulb covered with the hand, as just described for *Pyractomena borealis*, but no evidence of attraction toward the lamp was obtained. In view of the fact that the light of this species is rather more greenish than that of the other local Lampyridæ which have been studied (Coblentz, Can. Ent., 1911, vol. 43, pp. 355-360, and previous papers by the present writer) the experiment was tried of covering the bulb of the lamp with a thin leaf. With this modification of the colour of the light, and by using a long flash, in imitation of that previously described as one of the methods of light-emission of this species, it was found comparatively easy to attract the males so that they would approach the flashed light, but unless the bulb were shaded more as they drew nearer, they appeared to recognize some difference in the light and would fly away again. The response was not entirely uniform, even in the early evening when but comparatively few were flying; later, when several hundred insects might be within the range of the flash, a definite response was decidedly the exception, unless a particular, isolated insect near the electric light responded.

Four distinct types of light-emission on the part of this species were observed, agreeing with those previously reported (Can. Ent., 1910, vol. 42, pp. 358-360). First noted was a series of usually three, though sometimes four or five rapidly repeated flashes of considerable intensity, followed by darkness for several seconds; the flashing thus was repeated at intervals of from not more than three seconds to as much as half a minute. The series of flashes is suggestive of that of the male of *Pyractomena lucifera*, except that ordinarily not as many separate flashes are given, that there is a distinct interval of darkness between succeeding flashes in the series, and that the flashes in any series appear to be of diminishing intensity, (see diagram, Fig. 6). The specimens which exhibited this type of flash, came to the lamp when given the long flash described, and were usually, though not always, found to be males.

The second type of lighting observed was that which the writer has previously described as "a faint glow rapidly increasing in brilliancy. . . . It then ends suddenly. . . ." The only correction to make on this earlier observation is that this flash,

when observed close at hand, is seen not to be a continuous steady flash, but a series of very rapid pulsations, or a flash of very rapid variations in intensity, such as may be observed in a moving mirror image of an arc-lamp operation on alternating current. (See diagram). As compared with the phenomenon of the alternating

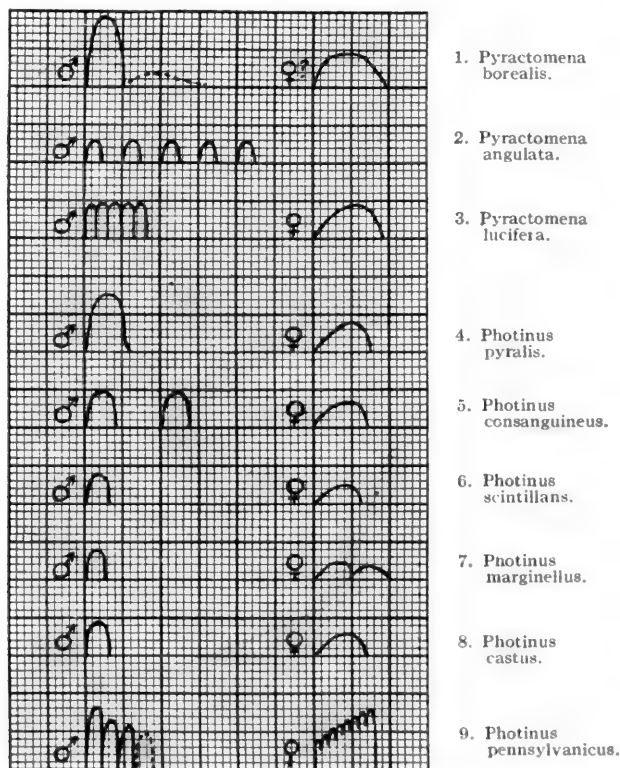


Fig. 6.—Chart showing relative intensities and durations of flashes of American Lampyridæ. (1 cm. vertically equals approximately 0.02 candle power; 1 cm. horizontally equals approximately one second in length of curves; space between curves representing flashes of male and female of same species, is arbitrary.)

current arc-lamp, the "frequency" appeared to be about 50 per second, rather slower than the lamp (60 cycles). One insect flashing thus was caught on the evening of May 27, and found to be a female, but at this time, none could be attracted to the electric light, by imitating either this flash, or that described in the preceding

paragraph, for the male. Later, notably on the evening of June 17, along the Chesapeake and Potomac Canal, only a few hundred yards from where the first observations were made, females giving this long flash, repeatedly came to electric lights operated in the flashing manner of the male, when used both by the writer and by Mr. H. S. Barber, the bulbs in both cases being shielded by a leaf. The reverse attraction, as described in the foregoing paragraph, was also observed at this time, and had previously been observed by Mr. Barber and the writer, along the Canal on the evening of June 3. There were, however, some curious exceptions: for instance, on the evening of June 5, at the writer's residence, 1901 Jackson St., N. E., this city, an insect giving the long flash was attracted to a lamp giving the flashing light, and when captured proved to be a male; also on the evening of June 13, at the same place, using the electric lamp giving a long flash, two females and four males were attracted, caught and identified. It was not found necessary that either sex be flying to respond; insects at rest on leaves and fences repeatedly responded by flashing to stimulation with the electric lamp, and would sometimes leave their locations and fly to the light. Good results were never obtained unless the light was either shielded with a leaf, or the bulb coated with a solution of malachite green and chlorophyl in collodion.

The third method of lighting observed for this species was that already described as single, not very bright flashes, emitted at intervals of a second or two while the insect is flying through the air in almost any direction, dropping from a tree, or running around on the ground or on the grass. In every instance these insects were found to be females. Operating the electric light in imitation of this flash did not seem to cause attraction of either sex, but in one instance, when a male was observed on a fence rail, giving his usual triple flash, and responding to the electric light flashes in imitation of the usual long flash of the female, the change to the type of flash above described caused him immediately to cease to respond. Provisionally we may regard this as the flash of a pregnant (or hungry) female.

The fourth type of light-emission consists of a single, short, bright flash, repeated at intervals of about four seconds or more. This flash is the least common, and insects flashing thus were

found to be males, and did not respond satisfactorily to the electric light.

Only rarely was attraction between the sexes in this species noted, and as mentioned in a previous paper, it is very rarely that pairs in couple are seen or taken. On account of the great numbers of the insects, and their habit of flying quite high, it is very difficult to follow closely any particular individual or pair. On one occasion a male and female were confined in a tube^d for some time, hoping that mating would take place; the male flashed irregularly, in single flashes, and the female appeared to answer him, but although she ceased to light and became quiet whenever the male touched her or ran over her back, he appeared to pay no attention whatever to her, and no mating was observed.

Mr. Barber informs the writer that he has frequently noticed dim, fixed points of light in the woods at night, which on investigation, proved to come from the luminous organ of a small adult *Photinus* that was being devoured by an adult *Photuris*, the latter in each case appearing to be a female. In several cases where a male and female of *Photuris* were confined together to secure eggs, the male was found to have been devoured during the night. These appear to be natural habits of the insect, both of which the writer has been able to conform. Mr. Barber also states that he has been informed by Mr. Harry L. Parker, of Hagerstown, Md., who has observed the pupa of this species, that in addition to the anal lights, there is a constant light emitted from the pupal prothorax, which persists through the teneral adult stage, but disappears as the beetle hardens.

3. *Pyractomena lucifera* Melscheimer. Experiments on the evening of May 15, on the attraction of the males of this species to a flashed electric light, were entirely negative. A lamp shielded with a leaf was not used at this time, but was tried later, still with negative results.

4. *Pyractomena angulata* Say. A male of this species was captured at the writer's residence on the evening of June 13; when in flight it gave a series of short, dim flashes, not unlike those described for the pregnant or hungry female *Photuris*, but fainter and of a decidedly orange colour. (See fig. 6). No attraction to the flashed electric light was noted. A female of this species

was taken in flight in mid-day near the same locality on May 30; in fact all females of this species which the writer has taken, have been caught flying in daylight. This flash does not agree with that of the insect which the writer supposed to be a male of *P. angulata* in 1912.

5. *Photinus consanguineus* Lec. This species was observed at Plummer's Island, Md., on June 3, and along the Canal on June 17. The interval between the two flashes constituting the light-emission of the male, was found to be variable, sometimes as much as two seconds. No attraction of the male to the electric bulb could be secured.

6. *Photinus scintillans* Say. The previous observations on this species were plentifully confirmed, but no new facts brought forth.

During this season a flash was observed on two separate occasions, but in the same locality, which does not correspond with that of any known Lampyrids of this vicinity. It consisted of a series of quite rapid flashes, somewhat like that of the male of *Pyractomena lucifera*, but of a distinctly orange tone. Both observations were made long after the normal period of prevalence of the *lucifera*. It was found impossible to capture the insect at this time, and the flash was not seen again, on later visits.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ DIPTERA). PART II.

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

(Continued from page 31.)

The following records also undoubtedly pertain to this species, but in the absence of the material are not included in the type series:

Fort Kent, Aroostook Co., Maine, August 19 (Johnson); White Cap Mt., Maine, August 17, 1905 (Jones); Dedham, Mass., Sept. 4, 1906 (Johnson); Brookline, Mass., Sept. 6, 1906 (Johnson); Cohasset, Mass., Oct. 1, (Bryant); Mt. Marcy, Essex Co., N. Y., July 30, 1913 (Young); Elm Lake, Hamilton Co., N. Y., August 2, 1912 (Young); Hazleton, Luzerne Co., Pa., August 20, 1909 (Dietz).

February, 1917

This interesting late-summer and early-autumn species is similar to *T. calcar* O. S., which, in the male sex, has the stigma of the wings almost indistinct, and the hypopygium very small and provided with short hairs; in *autumnalis* the stigma is brown and the elongate male hypopygium is densely provided with long, dark hairs. In the female sex, the reduced wings of the new species are very curious, (*autumnalis*, length of body 20 mm.; wings 9.5 mm.; *calcar*, length of body 17 mm.; wings 14 mm.), and the ovipositor has the tergal valves strong, powerful, almost straight and rather blunt at their tips; in *calcar*, the tergal valves are shorter, strongly up-curved and more pointed at their tips.

***Tricyphona cervina*, sp. n.**

Allied to *T. septentrionalis* Bergr.; colour light fawn-yellow; antennæ brownish black throughout, the basal flagellar segments crowded, the apical ones attenuated; mesonotum with three stripes; ovipositor and hypopygium bright yellow.

Male.—Length 6 mm.; wing 7.8 mm.

Female.—Length 8 mm.; wing 8.5 mm.

Rostrum and palpi dark brown. Antennæ dark brownish black, the first segment a little grayish pruinose; first six segments of the flagellum large and closely approximated, the remaining segments elongate and attenuated (as in *T. septentrionalis*). Head brownish gray, clearer gray behind and on the genæ beneath.

Mesonotal præscutum light brown with a golden pollen, with three dark brown stripes; the middle stripe is longest, narrowed behind, broadened anteriorly, indistinctly bisected behind by a vitta of the ground-colour; lateral stripes short; scutum and postnotum grayish yellow; scutellum more yellowish. Pleura reddish brown with a sparse gray or grayish-white bloom. Halteres pale yellow, the knobs very slightly darkened. Legs with the coxæ yellow, sparsely gray pruinose on the outer face; trochanters dull yellow; femora dull yellow, passing into brown at the tips; tibiae yellowish brown, a little darkened apically; tarsi brown. Wings nearly hyaline; stigma pale brown; veins brown. Venation: petiole of cell R_4 moderate, about equal to or shorter than cell $1st\ M_2$; cell $1st\ M_1$ pointed at inner end (as in *septentrionalis*); petiole of cell M_1 long, much longer than either cell M_1 or $1st\ M_2$; basal

deflection of Cu_1 at or just beyond the fork of M , about in a line with cross-vein $r-m$; cross-vein m rather indistinct.

Abdominal segments dark brown, the caudal and lateral margins narrowly paler, hypopygium with the pleurites bright yellow.

The female is similar to the ♂ but slightly larger, full-winged; ovipositor powerful, yellow, strongly upturned.

Habitat.—Colorado.

Holotype, ♂, Platte Cañon, Colorado, July 17, 1915, (Osler.)

Allotype, ♀, with the type.

This little species differs from both *debilis* Will. and *vitripennis* Doane, in the considerably smaller size; it differs from *debilis* in the paler fawn colour of the body, the long petiole of cell M_1 , the structure of the antennæ, and in numerous other details; from *vitripennis* in the gray head, dark antennæ, differences in the thoracic pattern and colour of the abdomen and its appendages. It differs from the more closely related *septentrionalis* Bergr. in the unmarked wings and fawn-coloured body.

***Tricyphona glacialis*, sp. n.**

Allied to *T. debilis* Will.; colour dark brown; antennæ dark brown throughout, the flagellar segments oval to rounded-oval, not attenuated; wings with a pale brown suffusion; cell 1st M_2 and M_1 very long; abdomen dark brown, the basal sternites more yellowish.

Male.—Length 9.6 mm.; wing 10.6 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the segments of the flagellum oval, the basal ones not crowded, the apical ones shortened, almost rounded. Head broad, black, very sparsely grayish pruinose; frontal tubercle distinct, high.

Mesonotum dark brown, very sparsely gray pruinose on the postnotum, the scutellum paler, more yellowish. Pleura dark brown, gray pruinose. Halteres very long and slender, brown, brightened at the extreme base. Legs with the coxæ brownish yellow; femora dull yellow, passing into brown on the apical third; tibiæ brownish yellow, a little brighter basally; tarsi dark brown. Wings with a pale brown tinge; stigma indistinct; veins brown. Venation: petiole of cell R_4 moderate, a little shorter than the elongated cell 1st M_2 ; petiole of cell M_1 about one-third the length

of the cell and of cell 1st M_2 ; cross-vein m connects M_{1+2} with M_3 , weak and tending to atrophy; Cu_1 leaves M_3 before mid-length of the long cell 1st M_2 .

Abdomen elongated, tergites dark brown, the caudal margins of the segments narrowly paler; basal sternites more yellowish than the terminal segments; hypopygium brown.

Habitat.—Alaska.

Holotype, ♂, Sitka, Alaska; June 16, 1899 (Kincaid).

Allotype, ♀, Saldovia, Alaska; July 21, 1899 (Kincaid).

Paratypes, ♂ ♀, Yakutat, Alaska; June 21, 1899 (Kincaid); ♂, Virgin's Bay, Alaska, June 26, 1899 (Kincaid); ♂, Saldovia, Alaska, July 21, 1899 (Kincaid).

The type is in the collection of the United States National Museum; the species is based on material taken on the Harriman Expedition, and was determined by Coquillett as being *T. debilis* Will.

The species agrees with *debilis* in many respects, but the general coloration is dark brown, not yellow; the basal segments of the antennæ are not reddish and the venation is different, the cells 1st M_2 and M_1 being greatly elongated. The abdomen and halteres are longer than is usual in this group of the genus.

GEOMETRID NOTES.

THE GENUS *DYSSTROMA* HÜBNER.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

The genus *Dysstroma* Hüb. (Verz. p. 333, 1825) with its type *truncata* Hufn. seems to be a natural group by itself. Hulst (Trans. Am. Ent. Soc., vol. XXIII, p. 283, 1896) under *Hydriomena*, cites *truncata* Hufn. as the type of *Dysstroma*. Warren and Hampson both refer the *truncata* group to *Polyphasia* Stephens, but treat it as a separate genus (Proc. Zool. Soc., p. 373, 1893, and Ind. Moths, III, p. 378). Mr. L. B. Prout points out in Trans. London Ent. Soc., part XVIII, p. 33, 1908, that *Polyphasia* cannot hold, as Hübner's name *Dysstroma* has priority. According to Mr. Prout's and my own views, what we have been calling *truncata* in North America is really *citrata* Linné ("Fauna Suecica," ed. II, p. 332, 1761).

February, 1917

Werneburg (Stett. Ent. Zeit., vol. XIX, pp. 49-57, 1855) shows, I believe for the first time, that *citrata* Linné is related to *truncata*. In Linné's original description of *citrata*, he speaks of the fore wings having a grayish central band, with a variegated outer margin and reddish yellow costal spot. *Dysstroma citrata* Linn. with its variations appears to be our American form, and *truncata* Hufnagel, though closely resembling it, is quite distinct. There is much doubt also as to the occurrence of *truncata* Hufn. in South America, as I have never seen authentic specimens of it.

I shall use the term *aberration* in this paper in place of *variety* in conformity with the practice of the European specialists, while *variety* will be employed in the sense of local race.

The typical *Dysstroma citrata* Linn., or gray form with variegated outer margins, seems to be rare, and is only found in cold climates and high altitudes. Our commonest form, which generally stands in collections as *Dysstroma truncata* Hufn., is *D. citrata* Linn. aberration *punctum-notata* Haworth, with the central band of the fore wings clear white. In Dyar's List, page 281, the aberrations of *truncata* Hufn. and *citrata* Linn. are badly confused, but I shall only consider *citrata* here; so the rest may be referred to *truncata*. *Dysstroma citrata* Linn., and its aberrations may be listed as follows:

I. *Dysstroma citrata* Linné.—Fore wings with a gray central area, variegated outer margin with reddish yellow costal spot.

This appears to be rather a rare form, probably occurring in the mountainous regions and colder climates. The central band of fore wings is even, uniform gray, with enough variegation in the outer margins not to be unicolorous. I have this form, if I have identified it correctly, from Atlin, British Columbia, collected by Mr. Anderson. The gray form taken in the East is not exactly the same, but I will place it here tentatively until more is known of the group and the genitalia can be studied. I have not seen aberration *fusca* Prout (Trans. London Ent. Soc., part XVIII, p. 50, 1908), which is unicolorous dark gray without variegations, but I hardly think it applies to the forms mentioned above.

Ab. (a) *punctum-notata* Haworth (Prod. Lep. Brit., p. 26, 1802).

This form has the central band of the fore wings clear white, the intra- and extradiscal lines not touching. In most collections it has been placed under *truncata*, in error, though the resemblance is close, but beneath, on hind wings, the extradiscal line of *citrata* has a much sharper angle. *Punctum-notata* Haw. occurs in most of the Eastern States and a few of the Western, and also in British Columbia. Packard seems to have found it quite abundant in the White Mountains of New Hampshire, and has quite a series in his collection from there. Mr. Prout has pointed out the distinctiveness of this aberration from *truncata* Hufn., and was one of the first to do so.

Ab. (b) *immanata* Haw. (Lep. Brit., II, p. 323, 1809). This form has the prominent, reddish yellow costal spot, with central band solid blackish gray, and brownish variegated outer margins. It appears to be rather a rare form in North America, but it may be more common in the north. I have specimens from Victoria, B.C., received from Mr. E. H. Blackmore, and also from Mt. Washington, New Hampshire. The black, central band will distinguish it at once from all other forms.

Ab. (c) *simpliciata* Walk. (List Lep. Brit. Mus., XXV, p. 1422, 1862).

This form has the central band blackish as in the aberration *immanata* Haw., but there are white spots at costa and inner margin. I have never taken exactly this form, the white spots in my specimens not being intense enough, but rather grayish. Possibly it is nearer the aberration *tysfjordensis* Strand. (Nyt. Mag. Nat., XXXIX, p. 62, 1901). The latter form is said to have a gray black central band with gray spots at costa and inner margin. I list these two forms provisionally, but we get aberrations which are very close to them if not identical. I believe these to be rather northern forms and not very common.

Ab. (d) *insolida* Prout (Trans. London Ent. Soc., p. 59, 1908).

This form has the central band pale gray, with the inner and outer lines on either side strongly contrasting black. I have two specimens from British Columbia which approach it very closely. The black, contrasting lines on either side of the central band will readily separate this form from all others.

?Ab. (e) *rufibrunnea* Warren (Nov. Zool., VII, p. 181, 1900).

This seems to be a form close to *punctum-notata* Haw., in which the white central band is more or less suffused with light reddish brown. The types, two females, came from Argentine, South America, so there is always a slight doubt as to their standing. Mr. Prout, who has seen the types, believes they are aberrations of *citrata*. The form I have identified as this one came from Mr. E. H. Blackmore, Victoria, British Columbia, and seems quite rare. There are several other aberrations of *citrata* Linn. found in Europe, but as I have not seen them as yet from North America, I think it is better not to list them.

2. Var. *brunneata* Packard, (Proc. Bost. Soc. Nat. Hist., XI, p. 47, 1867 [1861 in error, in Dyar's list]; Monograph, p. 108, pl. VIII, fig. 38, 1876).

This northern form was described from Labrador by Packard, and is very closely allied to *citrata* if not a variety or race of it. It is a small, stunted form, brown-shaded, with a cinereous central band, three times as wide at costa as on inner margin. It is difficult to say whether this should be listed as a distinct species or variety, as I have only seen two or three specimens other than the type. Taylor's *Mesoleuca casloata* resembles *brunneata* Pack., but is larger. They are, however, closely allied. In Dyar's list *brunneata* Pack. is incorrectly placed under *truncata* Hufn., and should be referred to *citrata*. In Ent. Zeit. Stettin, XXV, p. 160, 1874, Mœschler described "*Cidaria suspectata*," which must be close to *brunneata* according to the description. There is a copy of the original description in the Packard Monograph, page 130, 1876. The type of *suspectata* is said to be in the Staudinger collection and was taken in Labrador, as was *brunneata*. Both Staudinger and Mœschler later regarded *suspectata* as identical with *brunneata*, but there is a slight doubt as to the correctness of this view. The older authors did not have a very clear eye for differences, and in most cases were not very careful in their comparisons. Packard in the Monograph mixed the forms, as figure 38, plate VIII, is evidently *Dysstroma citrata* ab. *punctum-notata* Haw., the white central band of the fore wings showing plainly. On the same plate, figure 39, is *brunneata* Packard, while figure 40 is probably *ethela* Hulst. In the Packard collection there is a specimen just

like figure 40 from Victoria, B.C., which is *ethela* Hulst. Figure 41 of the same plate is our eastern *hersiliata*, while figure 42 is *Dysstroma* (*Mesoleuca*) *occidentata*, described by Taylor in the Canadian Entomologist, vol. XLII, p. 86, 1910. Note the sharp indentation of the intradiscal line in the figure, on the median vein, also the peculiar central band and wide basal space. There is always a chance of error in determining species from figures, but as Packard had the specimens in his collection, from which the figures were made, I think I have identified them correctly.

Dr. Dyar (Proc. U. S. Nat. Mus., vol. XXVII, p. 897, 1904) describes the larvæ of *hersiliata* Guenée and mentions rearing them on currant. Dr. Dyar also mentions that there is considerable variation in this species, there being a dark and a light form, and he thought the latter might be *ethela* of Hulst. Both forms will have to be studied as they seem to differ from our eastern *hersiliata*. Possibly they may be forms of *occidentata* Taylor.

Traversata Kellicott (Bull. Buffalo Soc., Vol. V, p. 45, 1886 [*transversata* in error in Dyar's List]) is not to be considered under *citrata* (*truncata*) as it belongs to another group.

Atrifasciata Hulst. (Entomologica Americana, vol. III, p. 214, 1887) described from one female from California, turns out to be a *Eustroma* or *Lygris* and not *Cleora* or *Mesoleuca* as placed by Hulst. (See Grossbeck's notes in Trans. Amer. Ent. Soc., vol. XXXIII, p. 338, November, 1907.)

Mesoleuca mulleolata Hulst is placed incorrectly as a synonym of *truncata* in Dyar's List. It was described in the Bulletin of the Brooklyn Entomological Society, vol. IV, p. 26, 1881, and is a very large species and very distinct when once separated. There were two types from Colorado in the Hulst collection, and I shall restrict the type to the white banded form there. This, in a general way, resembles the aberration *punctum-notata* Haworth of *citrata*, but the basal band of the fore wings has two very strong, toothed projections and the intradiscal band is inwardly less crenulate than in *citrata*. The extradiscal line of the fore wings runs straight from costa about 2.5 mm. before the first projecting tooth, and also the costal reddish spot is more accentuated than in *citrata*. The hind wings of *mulleolata* Hulst are darker than those of *citrata*, and the extradiscal line makes a much sharper angle. Then

again, *mulleolata* emerges a month earlier than *citrata*, namely in June, while the latter appears in July and August. The genitalia also show it to be distinct from *citrata*, the terminal spines being nearly three times as long and much stouter. The species, therefore, should be considered as distinct and so listed. Hulst's types are not in very good condition and more or less rubbed, so this is probably the reason why the older authors regarded it as *truncata*. I have specimens from Mr. Fernekes from Tacoma, Washington, and from Mr. Blackmore and Dr. Dyar from Victoria, B.C., and the Rocky Mountains. It is evidently a rare species in collections, but probably the characteristic locality has not been found.

Mulleolata Hulst has several striking forms which correspond to the forms of *citrata* and should be described, so that they may be understood. I may perhaps be criticized for naming aberrations, but I feel that we cannot correctly understand the limits of variation unless we do so. In many species it is absolutely necessary to do this, as different species have corresponding forms and would otherwise be confused with one another. I think it unnecessary to go as far as the European specialists do, but certainly every distinct form should have a name, and both Dr. Bastelberger and Mr. Prout concur in this view. The difficulty is to avoid splitting the forms too finely, as in the case of *truncata* and *citrata*. It is better to take a conservative view of them where confusion might arise, e. g., in the case of the white-banded forms of *citrata* and *mulleolata*, or the black-banded forms of the same, or in the case of many of the species of *Hydriomena*.

We may next consider the forms of *mulleolata* Hulst which seem to be worthy of names.

Dysstroma mulleolata Hulst, ab. *sobria*, nov.

Expanse 36-39 mm.

This is the black-banded form of *mulleolata* Hulst, corresponding to ab. *immanata* Haworth of *citrata*. The central band of the fore wings is solid black with no markings or whitish spots visible. The wing pattern is otherwise the same as in normal *mulleolata*, except that possibly the brown is a trifle more yellowish extradiscally. The aberration *sobria* can be easily recognized by the solid black central band and the date of appearance. Apparently this is one of the rarer forms, as other specimens show the transition

between the black-banded and the white-banded forms, the bands having begun to break up into spots of white or gray.

Holotype.—♂, Victoria, B.C., June 22, 1914, E. H. Blackmore, in my collection.

***Dysstroma mulleolata* Hulst, ab. *subumbrata*, nov.**

Expanse 39–40 mm.

In this form the black central band has begun to break up into grayish spots, especially at costa and inner margin. This form tends to show the transition from the black-banded to the gray or white-banded form. It corresponds to the aberration *simpliciata* Walker and *tysfjordensis* Strand of *citrata*. The outer area has the normal wing pattern of *mulleolata*, but in the character of the central band it is allied to *sobria*, except that the band is not solid black but broken into gray spots.

Holotype.—♂, Victoria, B.C., June 14, 1914; from E. H. Blackmore, in my collection.

Allotype.—♀, Victoria, B.C., June 24, 1915; in the collection of Mr. Blackmore.

Paratypes.—Victoria, B.C.; ♂, June 2, 1914; ♀, June 16, July 22, 1914, and June 26, 1915; in coll. Blackmore.

***Dysstroma mulleolata*, ab. *ochrofuscaria*, nov.**

Expanse 37–39 mm.

This form has the central band whitish, suffused with reddish brown, in fact, the whole fore wing is more or less suffused with brownish. It seems to be a somewhat rare form and represented in few collections and corresponds to ab. *rufibrunnea* Warren of *D. citrata*. It is yellowish along the costa just beyond the extradiscal band of the fore wings, and has a large, reddish brown costal spot at the anal angle. The hind wings have a reddish tinge along the outer margin.

Holotype.—♂, Victoria, B.C., June 27, 1915; in coll. Blackmore.

Allotype.—♀, Vancouver Island, B.C., July 16, 1905; in my collection.

Paratypes.—Duncans, B.C.; ♂, June 14, 1910; in coll. A. W. Hanham; ♀, Aug. 7, 1908; in coll. G. O. Day.

The forms of *D. citrata* and *mulleolata*, together with related species I have seen, may be listed as follows:—

1. *Dysstroma citrata* Linn. (gray central band).
 - (a) Ab. *punctum-notata* Haw. (white central band).
 - (b) Ab. *immanata* Haw. (black central band).
 - (c) Ab. *simpliciata* Walk. (black central band, white spots at margins).
 - (d) Ab. *tysfjordensis* Strand (black central band, gray spots at margins).
 - (e) Ab. *insolida* Prout. (gray central band, black at edge).
 - ?(f) Ab. *rufibrunnea* Warren (white centrally, suffused with reddish brown).
 - ?var. *brunneata* Pack. (blackish central band, brownish basally and extradiscally).
- Syn.? *suspectata* Moesch.
2. *Dysstroma mulleolata* Hulst.
 - (a) Ab. *sobria* Swett.
 - (b) " *subumbrata* Swett.
 - (c) " *ochrofuscaria* Swett.
3. *Dysstroma hersiliata* Gn.
 - " ab. *mirandata* Taylor.
4. " *walkerata* Pears.
5. " *occidentata* Taylor.
 - " ab. *mutata* Taylor.
6. " *ethela* Hulst.
7. " *casloata* Taylor.
8. " *boreata* Taylor.
9. " *decorata* Taylor.
10. " *hulstata* Taylor.

There are other species to be added, but I have not had the opportunity to examine them in series, so will omit them for the present. The aberrations *simpliciata* Walker and *tysfjordensis* Strand, I have doubtfully referred to our fauna, but at least we have very closely allied forms which, if not identical with the European forms, are hardly distinct enough to warrant description. A very interesting fact is brought forth by Edelston (Zool., XXI, page 8784), viz., that *truncata* is normally double brooded and passes the winter in larval form, while *citrata* is single brooded and passes

the winter in the egg. The larva of *truncata* differs from that of *citrata* in colour and form of anal joints.

In conclusion I wish to thank Mr. E. H. Blackmore and also Messrs. G. O. Day and A. W. Hanham for suggestions and loan of specimens. I am also deeply indebted to Mr. L. B. Prout, of London, England, for notes and references.

ON MILITARY SERVICE.

The following is a list of the officers and employees of the Entomological Branch of the Dominion Department of Agriculture, Ottawa, who have enlisted for Overseas Service either in the Canadian or Imperial Forces:

H. F. HUDSON, B.S.A.—Field Officer, Strathroy, Ont., 16th Battery, C. F. A. Wounded and permanently disabled for further active service.

E. H. STRICKLAND, M. Sc.—Field Officer, Lethbridge, Alta., Machine Gun Section, 196th Battalion (Western Universities), C. E. F.

H. S. FLEMING.—Messenger, Ottawa, 52nd Battery, C. F. A.

F. M. MACKENZIE.—Assistant, Fredericton, N.B., Princess Patricia's Canadian Light Infantry, (P. P. C. L. I.).

*F. W. WALSH.—Assistant, Lethbridge, Alta., Welsh Fusiliers.

H. S. BRODIE.—Assistant, Agassiz, B.C., Imperial Forces.

H. CURRAN.—Assistant, Vineland Station, Ont.

C. A. WILLIAMS.—Inspector, Fredericton, N.B., 23rd Battery, C. F. A.

G. F. BALL.—Inspector, Fredericton, N.B., 104th Battalion, C.E.F.

H. S. FLEWELLING.—Inspector, Fredericton, N.B., P. P. C. L. I.

**J. C. SHIPTON.—Assistant and Inspector, Annapolis Royal, N.S., P. P. C. L. I.

L. M. HOW.—Inspector, Annapolis Royal, N.S., 112th Battalion, C. E. F.

T. H. H. FORTIER.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

W. L. HARRIS.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

*Killed.

**Died in Hospital in France.

S. N. LORD.—Assistant, Ottawa, 75th Battalion, C. E. F.

T. RANKIN.—Assistant, Ottawa, P. P. C. L. I.

*A. H. BUSH.—Inspector, Vancouver, B.C., Pioneer Battalion.

The above list would be considerably longer had it been possible for the Government to release for military service more of the scientific officers. Most of the officers of the Branch have applied for leave of absence for military service, but in view of the importance which the Government lays on the maintenance of the agricultural production of the country it has decided that such trained men are serving the country to the best advantage by continuing their present work, especially in view of the scarcity of trained men, than by undertaking duties of a military character, and for this reason it has not been possible to release more than those whose names are included in the above list.

THE BAY FLEA-LOUSE, TRIOZA ALACRIS FLOR. AS A NEW PEST IN NEW JERSEY.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

For the past several years, this psyllid has been present in several green-houses in New Jersey, but only recently has it increased numerically enough to disfigure seriously its host, *Laurus nobilis*, the victor's laurel of the ancient Greeks. Its presence on bay trees can be readily detected by the curled, discoloured leaves, usually at the tips of the branches, containing what appear to be cottony masses. Upon uncurling a leaf, the nymphs are easily seen, clothed in a white, waxy secretion. As a rule, the edges of infested leaves are rolled in tightly toward the mid-rib and become thick, distorted and of a whitish colour, giving the tree in severe infestations, a sickly and unwholesome appearance.

In "Ziekten en Beschadigenen der Tuinbouwgewassen," by M. Van Den Broek en P. J. Schenk (Holland, 1915), the authors state that the bay leaf flea, so called, overwinters in the adult stage, appearing in the spring and depositing eggs on the undersides of the leaves, and that bays in and out of green-houses are

*Killed.

subject to injury. They also state that it is not a serious pest in Holland. In New Jersey, it is customary for owners of bay trees to keep them out of doors during the summer, and cool, storage sheds where the temperature is around 38 and 40 degrees F. during the winter. It is during the summer months, of course, when the trees are either outside or under glass that most of the damage takes place. Sometimes nearly every leaf on a tree is curled and discoloured, but as a rule it is the young, developing leaves which are infested. Trees thus disfigured are not salable, and when one considers that bay trees sell at from \$10.00 to \$100.00 and more for single specimens it is readily seen that a considerable money loss can be laid at the door of this psyllid.

Coming to remedies, picking off and destroying the infested leaves is one method, practical only if the infestation is slight or the number of infested trees small. Eight ounces of Black Leaf 40 plus eight pounds of whale-oil soap to one hundred gallons of water has been used in New Jersey with a fair degree of success as a summer spray. It is impossible, however, to reach the nymphs protected by the tightly curled edges of the leaves. According to Dafert and Kornauth in the Report on the Work Done at the Imperial and Royal Chemical Research Station in Vienna, 1913, pp. 80-95, a review of which appears in the Review of Applied Entomology, Series A, vol. II, 1914, p. 482, cyanide fumigation was tried against *Trioza alacris* Flor., on laurel with complete success. The reviewers state that the American 1-1-3 formula was used, but nothing is said about the cubic contents, temperature, length of exposure, etc.

At one place in New Jersey, where the infestation was severe during the summer and not completely controlled by the nicotine and soap spray, many last stage nymphs and adults were found on the trees November 15, after they had been placed in a storage shed, and it seems quite probable that fumigation with hydrocyanic acid gas at this time might be effective, inasmuch as both forms were fairly active. The adults evidently hibernate on the bay trees and become active as the temperature increases. Another dealer in bay trees in New Jersey allows his trees to remain out of doors until late in the season, taking them in only shortly

before freezing weather is likely to set in, and his trees are rarely troubled by the psyllid. This, however, may be only a coincidence.

This pest was evidently introduced into New Jersey on bay trees imported from Belgium, as practically all of such trees come from that country, and psyllid injured leaves are frequently noted when the stock arrives. Inasmuch as many of the trees are later shipped out of the State, it would not be strange if specimens of *Trioza a'acris* were turned up in other places, especially the Southern States. Van Duzee in his "Check List of the Hemiptera of America, North of Mexico," records it from California with *lauri* Targ., as a synonym.

ADDITIONS TO THE LIST OF MISSOURI CICADELLIDÆ (JASSOIDEA).

EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

The following list of 25 species is offered as an addition to the "Preliminary List of Jassoidea of Missouri with Notes on Species," which was published by the writer in joint authorship with E. S. Cogan in the Ohio Journal of Science for December, 1915, vol. XVI, No. 2, pp. 71-78. H. L. Horsfall published an addition of 29 species in the same journal for May, 1916, vol. XVI, No. 8, p. 53. The present paper brings the total number of species reported from Missouri up to 152:

Macropsis occidentalis Van D. Adults were swept from willows at Charleston during May.

Macropsis gleditschiæ O. & B. Quite numerous during May and June in southeastern counties. Captured principally from locust trees.

Macropsis tristis Van D. A specimen from central Missouri is in the collection of the U. S. National Museum.

Idiocerus ramentosus Uhl. Rather abundant on willows during late spring and early summer months in Southeast Missouri.

Idiocerus pallidus Fh. A few adults captured from an alfalfa field at Branson, in the heart of the Ozark Mts.

Idiocerus lachrymalis Fh. Occurs throughout the State, but not abundant.

February, 1917

Homalodisca liturata Ball. Occasional specimens taken in southern counties. Swept from weeds.

Gypona modesta Spangb. Two adults captured at Poplar Bluff.

Gypona bimaculata Spangb. Collected by sweeping rank growth in marshes near Charleston.

Platymetopius acutus var. *dubius* Van D. Rather numerous on grass in southwestern part of the State.

Deltocephalus melscheimeri Fh. Occasional specimens captured. Occurs throughout the State.

Athysanus comma Van D. One adult taken at St. Louis.

Athysanus anthracinus Van D. Rather numerous in western counties.

Phlepsius fulvidorsum Fh. Numerous on willows growing along creeks and rivers in Southwestern Missouri.

Phlepsius nebulosus Van D. Occasional specimens taken near Charleston.

Thamnotettix brittoni Osb. A few adults were swept from weeds at Charleston.

Chlorotettix balli Osb. Specimens captured were all from northern parts of State.

Chlorotettix lusorius O. & B. Occurs most numerous in eastern counties.

Jassus melanotus Spangb. Collected by F. M. Moody at Branson, by sweeping weeds growing on high ridges of the Ozarks.

Tinobregmus pallidus Osb. Two adults captured by F. M. Moody from low shrubs growing wild in the woods at Branson.

Cicadula punctifrons Fall. Few adults captured at Dexter.

Empoasca flavescens Fabr. Abundant on willows at Branson.

Empoasca trifasciata Gill. One specimen captured at Charleston, July 26.

Erythroneura illinoiensis Gill. Rather abundant in eastern counties.

Erythroneura crevecœuri Gill. Not common. Occasional specimens taken at Charleston.

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POPULAR AND PRACTICAL ENTOMOLOGY.

PRECIPITATION IN RELATION TO INSECT PREVALENCE AND DISTRIBUTION.

BY NORMAN CRIDDLE, DOMINION ENTOMOLOGICAL LABORATORY,
TREESBANK, MANITOBA.

In this paper an attempt is made to draw attention to a few instances of how humidity, chiefly in the form of rain or snow, has been and is instrumental in either aiding or curtailing the spread of insects over the country, particularly in the Prairie Provinces.

There are very few insects, if any, that can live through all their stages without the aid of moisture. Most of them, indeed, are very much dependent upon it, especially in their larval stages. Numerous examples could be given, and a suitable one is provided in the various races of Tiger Beetles (*Cicindela*). We find these beetles from haunts in close proximity to water, to habitations on plains of drifting sand, apparently far removed from it; yet an examination a few inches below the surface, in the latter place, will show that the sand, if not equally moist, is at least sufficiently so for the wants of the beetle larvæ, which are easily able to burrow down to it. There are occasions, however, when the insects' prairie haunts become very dry; at such times there is reason to believe that some of the larvæ perish while the remainder retire to the bottom of their burrows and remain inactive until such time as rain once more moistens the soil.

While most insects require water in some form or other, there are certain kinds which seem to thrive best when it is least prevalent, and are only found in the driest situation. In this class we have most of our locust pests, and the celebrated Rocky Mountain Locust (*Melanoplus spretis*) supplies a good example. This locust, as is well known, has caused enormous losses in years gone by and has invaded our territory on more than one occasion. There is somewhat of a mystery surrounding this insect at the present time

which may, indeed, never be solved. We know that its breeding grounds once extended over a very wide area, much of this having been classed as permanent by Riley and others who investigated the plague at that time. At present, however, the insect seems to have vanished completely. Indeed, there are some who would place it with the Passenger Pigeon as an object of the past. It seems almost incomprehensible, however, that such can be the case. More probably the real permanent breeding grounds are more restricted than was supposed, and the locust will yet be located either by the discovery of its real haunts or by a new invasion following favourable weather conditions for breeding purposes. This, however, is beside the question. What I wanted to point out was that the Rocky Mountain Locust always invaded Western Canada during a dry season, arriving in swarms from elsewhere in July or August. As this was the time of oviposition, eggs were soon deposited in vast numbers, and, as a result, crops naturally suffered much more the following year than they did on the insects' first appearance. While the locusts were able to breed for a season or so in the invaded territory they seldom remained long. Frequently an excess of moisture to what they had been accustomed to produced sickness from which many died, while others taking advantage of sunny days and favourable breezes drifted to parts unknown.

In other words, dry weather had enabled them to overstep their usual breeding grounds, only, however, to be driven out or killed by a return to normal climatical conditions. The same dryness which induced an invasion of Rocky Mountain locusts was also instrumental in increasing the indigenous species of *Orthoptera*, so that such kinds as the Lesser Migratory Locust (*M. atlantis*) became almost as destructive as its close relative mentioned above, while many other species were sufficiently numerous to aid materially in the work of destruction. We have another example of an insect's control by conditions of humidity alone in the Western Wheat-stem Sawfly (*Cephus sp.*). In this instance a lack of precipitation causes a dearth of the flowering stems of grasses in which the larval life is passed, resulting in a decrease of the species in proportion to prevalence of suitable grass stems for breeding purposes. This, of course, relates to natural conditions before

the husbandman made his appearance. The sowing of cereals has altered matters so that when the grasses fail to produce stems the saw-flies were able to continue their increase by attacking wheat and rye, with the result that they are now a serious pest.

Yet another insect which is checked by lack of moisture is the Hessian Fly. Dry seasons are generally recognized as anti-fly years and in Manitoba the partial second brood is frequently destroyed outright by a premature ripening of the grain, due to dry, hot weather conditions in late July. A knowledge of this fact is often of the greatest importance in forecasting as to the probabilities of a Hessian-Fly outbreak. It also comforts us in the thought that weather conditions will seldom remain favourable to the insect for any length of time, though we have the unpleasant knowledge that good crop years are frequently best adapted to Hessian-Fly increase. Moisture is probably still more important over northern latitudes in the form of snow when it provides a thick covering to the objects beneath, protecting them from both frost and sun. It is really astonishing how a blanket of snow will afford protection even to the tender plants. For instance, potatoes have more than once survived the winter, even in our invigorating Manitoba climate where the temperature, at times, attains a minimum of fifty below zero. Yet expose these same potatoes directly to four or five degrees of frost and they will present a sorry spectacle next morning.

Snow is unquestionably a very important factor in preserving insect life in winter time, and there is no doubt that it is largely responsible for the preservation of many forms which would perish without its covering. Perhaps there is no better example of its preserving influence than was shown by the Colorado Potato Beetle. This beetle invaded Manitoba a number of years ago, but did not become a serious pest until comparatively recent times. It had, however, gradually extended its range northward. In 1913 its ravages were severely felt in Southern Manitoba as far north as latitude 50° and to a lesser degree for some distance farther north. In the winter following, that is 1914-15, there was a great scarcity of snow in portions of the province so that some places used wheels throughout the winter. The result of this lack of snow was that the frost penetrated considerably deeper into the ground than

usual. While an occasional thaw came in direct contact with the surface, thus providing a thawing and freezing condition known to be detrimental to insect life, there is no doubt that several species suffered in consequence, but the Colorado Potato Beetle, as a rule, burrows sufficiently deeply to escape the thawing effect, hence frost alone was to be reckoned with.

The result of this lack of snow was very marked the following May. Beetles which had gone into winter quarters in a healthy condition were found huddled together in a state of death, not a single living example being located in the more exposed situations, though later in the season odd individuals turned up on potato plants forming the nucleus for future generations. The country was by no means all affected in the same way; some parts had a light covering, others a foot or more. Consequently the amount of snow necessary for protection could be ascertained with reasonable accuracy. As was mentioned above, complete lack of snow, or less than three inches, did not afford sufficient covering for the beetles. The few survivors having probably sought shelter beneath some straw or brush pile. Where there was a depth of snow amounting to from four to six inches the survivors were considerably increased. At eight inches about half the beetles survived, while a foot or more of snow apparently produced complete immunity from frost.

In the vicinity of the Entomological Laboratory at Treesbank very few beetles escaped, which proved a great boon to potato growers. The effect of this winter killing is still very marked (1916), less than one per cent. of the plants being infected. Near Winnipeg, on the other hand, where the snow fall was ample no mortality was noticeable among the beetles, and they have continued to be a serious pest there.

From the above account it is evident that snow plays an important part in the preservation of animal life, it also saves many a garden plant from destruction. Under normal conditions it will continue to afford protection to the Colorado Potato Beetle, but we can at least see that there will be years of severe check, like the winter of 1914-15. While there is every reason to believe that those portions of the country where snowfall is light will never prove a prolific breeding ground for that insect.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD.

(Continued from vol. XLVIII, p. 380.)

Anytus obscurus Sm. The palest specimens stood separated as *privatus*, of which *obscurus* is very likely only a suffused variation. The more suffused specimens stood as *profundus*, which Smith described from Manitoba as a species distinct from *obscurus*, the latter being described from Calgary on the same page. His subsequent attempt to prove the two distinct on genitalic characters is quite unconvincing. I use *obscurus* as the prior name by a page.

Anytus (Fishia) derelicta Hampson. Most of the specimens stood as *Hadena relecina* Morr., an old and widespread error which Heath had apparently never had corrected. One with paler secondaries than usual was separated as *yosemita* Grt., but wrongly. *Instruta* Smith, described from De Claire, Man., may prove to be a prior name to *derelicta*.

Ufeus satyricus Grt. Some specimens were separated as *plicatus* Grt.

Mamestra mystica Sm.

Mamestra imbrifera Gn. Heath repeatedly sent me this species as *rogenhaferi*, under which name there is a specimen in the Rutgers College from Winnipeg, apparently distinct from anything else known to me.

Mamestra purpurissata Grt. Mostly standing as *juncimacula* Sm.

Mamestra meditata Grt. Most of the specimens were near var. *columbia* Sm. Two specimens of *Tricholita signata* stood mixed with the series.

Mamestra lustralis Grt. var. *cervina* Sm. Smaller and duller than the typical form.

Mamestra segregata Sm. (syn. *gussata* Sm.) and var. *negussa* Sm.

Mamestra detracta Walk. var. *neoterica* Sm. Smaller and duller than the typical form of the species, as is so frequently the case with Manitoba races. One series stood as *goodellii*, and another as *acutetermina*. Two more specimens, one of them an unusually contrasting variety, stood elsewhere as *cuneata* Grt., which they in no way resembled.

March, 1917

Mamestra distincta Kbn. . One female, without date.

Mamestra chunka Sm. One female, May 29th, 1913, standing in company with one *trifolii* Rott., and one *mutata* Dod, under the latter name.

Mamestra farnhami Grt.

Mamestra obesula Sm.

Mamestra atlantica Grt.

Mamestra radix Walk.

Mamestra subjuncta G. & R.

Mamestra grandis Bdv. Some under their correct name, and another series under *legitima* Grt.

Mamestra lubens Grt.

Mamestra trifolii Rott. Also a series of mottled specimens erroneously as "var. *trifolii*, var. *albifusa* Walk. *oregonica*."

Mamestra rosea Harv.

Mamestra picta Harris.

Mamestra assimilis Morr.

Mamestra adjuncta Bdv.

Mamestra tacoma Strk.

Mamestra lilacina Harv.

Mamestra goodellii Grt. var. *acuterminalis* Sm. Standing, (with one *Hadena plutonica*) as *neoterica* Sm. It must be readily admitted that *acuterminalis* and *neoterica* are often most puzzlingly alike in Manitoba, though I had not before imagined confusion possible. It was surprising how well Heath had them separated, though he had the names reversed. Two specimens of *acuterminalis* also stood apart as "*Noctua*, not identified by Smith."

Mamestra obscura Sm. Most of the series were more mottled with brown than is usual in Alberta specimens.

Mamestra renigera Steph.

Mamestra olivacea Morr. Smith described the race from this region as *lucina*, but I cannot see that the name is anything but a synonym of *olivacea*.

Mamestra lorea Gn.

Mamestra anguina Grt., (syn. *larissa* Sm.) A series standing as *larissa* were all correct. Of three specimens separated as *anguina*, one was this species, and the other two *cervina*; whilst of four specimens doing service for *incurva* Sm., two were *larissa* and

two *vicina*. It may here be remarked that mixtures of this kind were not infrequent in Smith's own collection, when I saw it in 1910.

Mamestra vicina Grt.

Barathra curialis Sm. Mixed with *Mamestra lubens*, to which it bears rather a close resemblance.

Dargida procinctus Grt.

Morrisonia evicta Grt. Standing as *sectilis*, which was probably Smith's error. The var. *vomerina* was correctly named. Holland, Pl. XXIV, pp. 13, 14, are of *evicta*, not *sectilis*, and fig. 14 is var. *vomerina*.

Xylomiges dolosa Grt.

Cardepia (*Mamestra*) *mutata* Dod. One specimen, but with *trifolii* and *chunka* wrongly associated with it, as mentioned under those headings. Sir George Hampson has critically examined my species, and tells me that it belongs to the genus *Cardepia*.

Nephelodes emmedonia Cram. (syn. *minians* Gn.) Dark specimens stood as *violans* Gn., and pale ones as *tertialis* Sm. The latter name is a pure synonym of *emmedonia*. *Violans* is a violaceous form of it.

Leucania unipuncta Harr.

Leucania luteopallens Sm. (= *pallens* Linn., probably). The species stood as *minorata* Sm., which is scarcely recognizable as a variety.

Leucania albilinea Hbn., (syn. *obscurior* Sm.)

Leucania dia Grt. Standing as *megadia* Sm., which is a variation possessing a black basal streak, an evanescent character.

Leucania multilinea Walk.

Leucania commoides Gn.

Leucania phragmitidicola Gn.

Orthodes crenulata Butl.

Orthodes cynica Gn.

Orthodes vecors Gn. Two badly worn specimens, one of them dated July 5th, 1907.

Himella contrahens Walk. The form here seems darker and more even than *infidelis* Dyar, and to be almost typical *contrahens*, though I am not satisfied as to their distinctness.

Crocigrapha normani Grt. One female, May 30th, 1912.

Eriopyga (*Tæniocampa*) *uniformis* Sm. Specimens stood under this name, and others were separated as *peredia* Grt. (= *furfurata* Grt.) and *communis* Dyar. There were none of the last named species in the collection. I am not assured of the distinctness of the other two, but the Manitoba form agrees better with *uniformis* than with true *furfurata*.

Eriopyga oviduca Gn.

Monima (*Tæniocampa*) *hibisci* Gn. (= *alia* Smith, etc., nec Guen.) Specimens stood in three different series, as. *pacifica*, *instabilis* and *brucei*.

Monima revicta Morr. (*subterminata* Sm.) Five specimens, and one of *hibisci* wrongly associated with them.

Tricholita signata Walk. Standing correctly, and two specimens with *Mamestra columbia*.

Lithomoia germana Morr.

Graptolitha (*Xylina*) *disposita* Morr. A long and variable series, some of which stood wrongly as *hamina* Grt.

Graptolitha bethunei G. & R.

Graptolitha innominata Sm.

Graptolitha petulca Grt. Two stood with *amanda*, one of them dated Sept. 27th, 1904.

Graptolitha amanda Sm.

Graptolitha fagina Morr. Three specimens.

Graptolitha georgii Grt. Standing correctly, and also as *holocinerea*, *vertina*, *ancilla* and *oregonensis*. All are synonyms of *georgii*, with the doubtful exception of *oregonensis*.

Graptolitha unimoda Lint. Smith redescribed this from Manitoba specimens as *merceda*, though Heath had *tepida* under the latter name. This group of *Xylina* was badly mixed in the collection.

Graptolitha laticinerea Grt. Smith redescribed the species as *winnipeg*, but used to confuse it with *unimoda*. It must be admitted that the group is rather a difficult one.

Graptolitha cinerosa Grt. (syn. *grotei* Riley). Five specimens were found mixed with *laticinerea* and a few *unimoda*. The line between *cinerosa* and *laticinerea* is often very difficult to draw, and I have rarely, if ever, seen a collection in which they appeared to be correctly separated.

Graptolitha (Xylina) antennata Walk.

Graptolitha tepida Grt. Smith described it from Manitoba as *atincta*, creating an exact synonym.

Graptolitha pexata Grt.

Litholomia napæ Morr.

Xylotype (Xylina) capax G. & R. One poor specimen, Sept. 7th, 1905.

Calocampa curvimacula Morr.

Calocampa nupera Lint.

Calocampa cineritia Grt.

Calocampa thoracica Grt.

Cucullia asteroides Gn. Four specimens. I have a slide of the genitalia of one of them.

Cucullia omissa Dod. Six specimens, three of which I have made cotypes.

Cucullia postera Gn. Standing as *florea*.

Cucullia speyeri Lint.

Cucullia intermedia Speyer. Females stood correctly, but males were separated as *cinderella* Sm.

Rancora albicinerea Sm. A specimen of *Cucullia intermedia* stood under this name, but two of *albicinerea* stood apart elsewhere unlabelled.

Asteroscopus borealis Sm. There were no specimens of this very rare species in the collection, though the type was captured near Cartwright. There was, however, a large pencil drawing of the body and right wings, presumably of the type, labelled "Poplar catkins, Long River, Man., 1884, May 1st."

Bellura obliqua Walk. One pair, agreeing with Holland's figure.

Nonagria subflava Grt.

Tapinostola variana Morr.

(The *Hydræcias* and *Papaipemas* have been determined by Mr. Bird.)

Hydræcia velata Walk.

Hydræcia nictitans Linn. A short series were also separated as *juvenilis* Grt.

Hydræcia immanis Gn.

Hydræcia perobliqua Hamp.

Papaipema rigida Grt.

Papaipema harrisii Grt.

Papaipema purpurifascia G. & R.

Papaipema pterisii Bird.

Papaipema nebris Gn. Two specimens. Holland's figures of *nebris* and var. *nitela* are reversed.

Papaipema nelita Strck.

Papaipema frigida Sm., and var. *thalictri* Lyman.

Papaipema humuli Bird. Standing as *circumlucens* Sm.

Papaipema marginidens Gn. Standing as *rutila* Gn.

Pyrrhia cilisca Gn. Two pair. This is the *umbra* of North American collections generally.

Pyrrhia exprimens Walk. Two males and a female. An examination of male genitalia of this and the foregoing, mounted by Mr. Tams, has strengthened my opinion as to the distinctness of *cilisca* and *exprimens*.

Xanthia flavago Fab.

Mesolomia iris Gn.

Trigonophora periculosa Gn. and var. *v-brunneum* Grt.

Cinædia pampina Gn.

Scoliopteryx libatrix Linn.

Enargia (*Cosmia*) *decolor* Walk. (= *paleacea* Sm. non Esp.)

Enargia infumata Grt. (syn. *punctirena* Sm.)

Amathes (*Orthosia*) *bicolorago* Gn. and var. *ferruginoides* Gn.

Amathes verberata Sm.

Amathes puta G. & R. (syn. *curoa* G. & R.) A series as *curoa* and another as *dusca* Sm., which is the same species. This was also very badly mixed up with *Parastichtis discivaria*.

Amathes aggressa Sm. Two females. These two specimens, identified for me by Messrs. Barnes and McDunnough, appeared to be very obviously distinct from *puta*, being both large and pale. Other specimens which I have seen resemble that species much more closely. The difference in the male genitalia points to their being probably distinct.

Amathes inops Grt. A few were under their correct name. Some were mixed with *Tapinostola inquinata*, and scattered about amongst sundry other species.

Agroperina (Orthosia) lineosa Sm. and var. *pendina* Sm.

Agroperina lutosa Andrews. So standing were four of this species and one of *Scopelosoma sidus*. A large number were mixed up with other species, especially with *Euxoa scandens*. A series of *lutosa* and two *lineosa* stood as *inficita* Walk. (A prior name for *belangeri* Morr.)

Agroperina helva Grt.

Parastichtis discivaria Walk. Another badly mixed species.

Scopelosoma tristigmata Grt.

Scopelosoma sidus Gn. Standing as *walkeri*. The two are very difficult to separate, but I am not aware that *walkeri* occurs in Manitoba.

Scopelosoma devia Grt.

Glæa inulta Grt.

Epiglæa decliva Grt. Holland's figure under this name is probably *signata*.

Homoglæa hircina Morr.

Homoglæa carbonaria Harv. One specimen, Sept. 24th, 1910.

Calymnia orina Gn.

Ipimorpha pleonectusa Grt.

Copablepharon grandis Strk. One female, without date.

Heliothis armiger Hbn.

Heliothis phlogophagus Grt.

Rhodophora florida Gn.

Schinia cumatilis Grt.

Melaporphyria oregonica Hy. Edw.

Melicleptria villosa Grt. One female, resembling Alberta specimens which I have identified.

Melicleptria ononis Schiff. (syn. *septentrionalis* Hy. Edw.) One pair.

Plagiomimicus expallidus Grt.

Calpe canadensis Beth.

Panchrysia purpurigera Walk.

Plusia æroides Grt.

Plusia balluca Geyer.

Euchalcia venusta Walk.

Euchalcia contexta Grt. A single specimen was in the collection with no date or label on it of any kind.

Euchalcia putnami Grt.

Euchalcia bimaculata Steph.

Euchalcia biloba. One male, May 22nd, 1911.

Euchalcia californica Spezer. One female, standing as *pseudogamma*, with a specimen of the latter species sent to Heath by the author. It is strange to note the scarcity of *californica* in Southern Manitoba.

Euchalcia precationis Gn.

Euchalcia brassicae Riley.

Euchalcia flagellum Walk.

Euchalcia rubidus Ottol. A figure only, probably one of the types, as Cartwright was amongst the localities from which it was described.

Euchalcia ampla Grt.

Euchalcia falcifera Kirby, and var. *simplex* Walk. None of the specimens were very dark.

Abrostola urentis Gn.

Ogdoconta cinereola Gn.

Alletia argillacea Hbn. One specimen, Sept. 30th, 1905, and associated with it, a bodiless worn specimen, probably *Agroperina lutosa*.

Rivula propinqualis Gn.

Erastria albidula Gn.

Erastria carneola Gn.

Erastria includens Walk.

Erastria panatela Sm. One male, without date, standing with *Tapinostola inquenata*.

Galgula partita Gn. A single ♂. Dr. McDunnough said that this was var. *ferruginea*. My notes on *ferruginea* type (♂) say "a pale form, and reddish." It must not be confused with the dark vinous female of this species called *hepara*.

Lithacodia bellicula Hbn.

Xanthoptera semiflava Gn. A splendid series.

Acontia binocula Grt. Standing as *candefacta* Hbn.

Acontia candefacta Hbn. Standing as *erastricides* Gn.

Spragueia tortricina Zell. A good and variable series. Mr. Wallis submitted this species to Mr. Gibson, and he said that it

was "*Fruva modesta*," and the dark form in the series may be *obsoleta*. I possess *tortricina* compared with the type, and have a note saying that *obsoleta* (also type) is probably the same species. Hampson makes *modesta* a dull form of *tortricina*, but he has not seen the type. I feel sure that *tortricina* at least is in the Heath collection.

Homopyralis contracta Walk.

Mycterophora slossoniæ Hulst. Dr. Dyar has found that this is a Noctuid genus.

Drasteria erectea Cram.

Drasteria crassiuscula Harv. A good series of these two species, and as far as could be judged, fairly well separated. Males are not always separable without reference to the genitalia. Amongst both series were some peculiarly small forms.

Drasteria distincta Neum.

Euclidia cuspidata Hbn.

Melipotis nigrescens G. & R.

Melipotis versabilis Harv.

Syneda hudsonica G. & R.

(The *Catocalas* were determined by Messrs. Barnes and McDunnough.)

Catocala manitoba Beut.

Catocala cratægi Saund.

Catocala abbreviatella Grt., and var. *whitneyi* Dodge.

Catocala coccinata Grt.

Catocala cerogama Gn.

Catocala zoe Berh. Dr. McDunnough says that this is probably a good species, and not a variety of *ilia*.

Catocala parta Gn.

Catocala unijuga Walk., and var. *lucilla* Worthington. This latter is apparently on Mr. Beutenmüller's authority. Dr. McDunnough says that to his knowledge the name *lucilla* has not been published, but that the specimen in question is probably a faded variety of *unijuga*. *Lucilla* is unknown to me. In Smith's Catalogue it stands as a synonym of *unijuga*, apparently on the authority of Hulst. Sir George Hampson treats it as a synonym of *semi-relicta*.

Catocala meskei Grt. One specimen standing as "pura, dark form," and presumably so recorded by Heath.

Catocala briseis Edw.

Catocala faustina Strk. var. *verecunda* Hulst.

Catocala aspasia Strk.

Catocala concumbens Walk.

Catocala luciana Hy. Edw.

Catocala relictata Walk., and var. *clara* Beut.

Zale horrida Hbn.

Phocyma lunata Dru. One very badly worn specimen.

Phocyma minerea Gn. A considerable number under three names; one as *minerea*, the majority under *norda* Sm., which is a synonym, and three as "? *lineosa*."

Phocyma galbanata Morr. (syn. *lineosa* Sm., nec Walk.) One specimen, standing as *lunifera*.

Phocyma unilineata Grt.

Thysania zenalia Cram. One specimen of this migrant from the West Indies.

(The doubtful Deltoids were submitted to Messrs. Barnes and McDunnough.)

Epizeuxis lubricalis Hbn. There were large and small specimens, looking rather like two species.

Epizeuxis rotundalis Walk.

Epizeuxis americalis Gn.

Epizeuxis æmula Hbn.

Hormisa absorptalis. Two specimens.

Hormisa bivittata Grt. Two specimens.

Hormisa pupilloris Grt.

Philometra gaosalis Walk.

Philometra hanhami Sm. Agrees with the description.

Chytolita morbidalis Gn. Mixed with *Renia flavipunctalis* Geyer, and *factiosalis* Walk.

Bleptina caradrinalis Gn.

Renia flavipunctalis Geyer.

Palthis angulalis Hbn.

Capis curvata Grt. Two specimens.

Bomolocha bijugalis Walk.

Bomolocha scutellaris Grt.

Bomolocha atomaria Sm. (syn. *chicagonis* Dyar.)

Bomolocha lotalba Sm. A long series, including male and female cotypes.

Plathypena scabra Fab.

Hypena humuli Harr.

Thyatiridæ.

Habrosyne scripta Gosse.

Pseudothyatira cymatophoroides Gn., and var. *expultrix* Grt.

Contrary to my former belief, evidence seems to point to the probability of these being forms of one species.

Euthyatira pudens Gn.

Notodontidæ.

Melalopha apicalis Walk.

Melalopha strigosa Grt. One specimen.

Melalopha albosigma Fitch.

Melalopha brucei Hy. Edw.

Datana ministra Dru.

Hyperæschra stragula Grt.

Hyperæschra georgica H. S. One male without date, identified for Heath by Dr. Dyar. It is much paler than Holland's figure, and the transverse lines contrast. Mr. Criddle's collection also contained a specimen of this very rare species.

Notodonta simplaria Græf. One specimen.

Odontosia elegans Strck.

Pheosia dimidiata H. S.

Lophodonta ferruginea Pack. One specimen, June 23rd, 1911.

It is like Holland's figure, but darker and more even.

Lophodonta angulosa S. & A.

Nadata gibbosa S. & A.

Nerice bidentata Walk.

Symmerista albifrons S. & A. Two specimens, June.

Dasylophia anguina S. & A.

Heterocampa bilineata Pack. One male, June 22nd, 1901. Near Holland's figure, but even, greyish.

Ianassa lignicola Walk. Two, July 22nd, 23rd, 1905.

Schizura ipomææ Daub. Two females so standing. Var. *cinereofrons* Pack. A series of males stood thus, and Mr. Wallis informs me that the form is so named in his collection.

Schizura cōncinna S. & A.

Schizura semirufescens Walk., probably var. *perangulata* Hy Edw.

Schizura unicornis S. & A.

Schizura badia Pack.

Schizura leptinoides Grt.

Cerura scitiscrupta Walk., var. *multiscripta* Riley.

Cerura occidentalis Lint.

Harpyia cinerea Walk.

Harpyia scolopendrina Bdv. As figured by Holland.

Gluphisia septentrionalis Walk.

Gluphisia sp. Two males, one dated June 3rd, 1905, apparently distinct from anything else known to me, but near *septentrionalis*. I compared a Winnipeg specimen with Packard's figures some years ago, and noted that it resembled *wrightii* as there figured, but it cannot be *wrightii*. I submitted a specimen to Messrs. Barnes and McDunnough, who said it was "nearest *lintneri* which we have from the same general region." It certainly is not *lintneri*.

Liparidæ.

Hemerocampa leucostigma S. & A.

Hemerocampa definita Pack. A series, agreeing with Holland's figure.

Alone vagans B. & McD., var. *grisea* B. & McD. This is the species which has always been widely known as *plagiata* Walk., but that species is the same as *definita* Pack. The form is normally brown or grey-brown, but some of the Heath specimens were very blackish grey.

Lasiocampidæ.

Malacosoma fragilis Stretch. The species was so named in the collection. I am not sure that *americana*, *fragilis* and *pluvialis* are always separable except by larval characters.

Platypterygidæ.

Oreta rosea Walk.

Drepana arcuata Walk.

Falcaria bilineata Walk.





PHALONIA SPARTINANA B. & McD.

(See p. 96)

A FEW NOTES ON THE LIFE HISTORY OF PHALONIA SPARTINANA.

BY C. N. AINSLIE, U. S. BUREAU OF ENTOMOLOGY.

This moth, recently described in the pages of the Canadian Entomologist* by Drs. Barnes and McDunnough, has been but once or twice taken in the open by the writer, but a number of adults have been reared in captivity at Elk Point, South Dakota. The species appears to cover a wide range of territory, for the larvæ have been found by the writer from the Canadian boundary to Southern Iowa, in fact the host grass, wherever it grows, seems to be infested by this insect.

The host grass, *Spartina michauxiana*, upon which the larvæ feed, occurs on low land and in swampy places, making a very rank growth. At times it attains a height of eight or nine feet, with a lower stem as large as a lead pencil or even larger. It is known as rope grass, or, locally, as red gut. In Eastern South Dakota the larvæ of this moth invade this grass very extensively, the infestation being as great in some places as 50%. The presence of the larvæ is shown, when the grass stem is split, by a fine, free, granular frass that loosely fills the gallery made by the borer.

The Egg.

The egg of the moth is of the disk type, so usual among the Tortricids. It is an irregular, flattened, disk-like form, ornamented by coarsely dotted radiating lines. A very few of these eggs have been seen, attached to the glumes of the *Spartina* head, the eggs being laid in ribbons of four or five, fastened together by their edges. The diameter of these disks is about .6 mm.

The Larva.

As soon as it leaves the egg the larva appears to feed first on the contents of the *Spartina* glumes, boring into one after another and devouring the anthers and stigmas of the undeveloped florets. After feeding for a week or more in this manner, it moves down to the stem, just below the base of the head and bores a circular opening into the stem after first spinning a slight silken shelter for itself for protection before it gets fairly inside. The opening it makes is about .75 mm. in diameter.

*Vol. XLVIII, 1916, p. 144.
March, 1917

One of the peculiar features of this species is the prodigality with which it sacrifices its individuals when very young. The young larvæ that feed in the glumes are to be numbered by the dozens in some of the infested heads, yet as far as the study of the species can determine, but one of these can survive in the course of the season. Several often find their way into the stem centre by separate openings, but invariably only one of these appears to survive. Several times one larva in a stem has been found feeding on a half-eaten rival. And it is certain that when winter comes there is but a single individual within each infested stem. Some explanation for this apparently useless expenditure of life may be discovered during future studies of this species, but at present it is an enigma. The reason why a single larva occupies an entire stem is clear, since a single stem affords nourishments for but one borer and self preservation compels the destruction of all competitors by the individual possessing the most vigour or the commanding position.

The parenchyma in the upper stem is unbroken and the gallery there is continuous. Farther down, the larva occasionally takes advantage of lesions in the parenchyma and passes sometimes for several inches with no sign of a mine. The nodes are, of course, solid and these are of necessity bored. Near the base of the stem there are few lesions, the larva is much larger, and the gallery is continuous.

The larva enters the stem during August, and by the middle of October, its progress depending upon the character of the season, it usually reaches the stem base. From lack of vitality or for some other reason a few of the larvæ always fail to reach the base before winter, and many of these belated individuals perish during the winter. Those in the hibernation chamber underground appear to survive almost without exception. This chamber is merely the portion of the gallery at the very base of the stem. It is cleared of frass, often but not always lined with delicate, transparent silk, and here the larva hibernates until the middle of the following May. For two years the writer supposed this was also the pupation chamber, but before the end of May the stems are for the most part vacated, the guests disappearing through an opening eaten through the stem about ground level. A fortunate discovery solved the

mystery. It was learned that when the larvæ leave the hibernation cell they move at once to the fresh growth of the spring, the young grass shoots being then perhaps eighteen inches tall. These shoots are entered near their upper end, where the long blades coalesce into a spongy stem, and the larvæ of the previous year begin once more to feed upon the fresh and succulent interior of this growing sprout. Boring downward nearly to the ground they reach maturity, become sluggish, line a portion of frass-free gallery with a delicate silken tissue and pupate here some time early in July. At the time of pupation the larva measures from 15 mm. to 18 mm. in length, and is a half-transparent, watery green colour with sometimes a yellowish tinge.

The Pupa.

The pupa is a chestnut brown and measures about 12 mm. in length by 3 mm. in diameter. During emergence the moth drags the pupal envelope almost completely from the stem.

The Adult.

The first adult to be reared in captivity appeared in a cage July 19th, 1915. These moths continued to emerge during July and well into August, the last one being taken about August 15th. Several adults were captured on July 20th, 1916, in the vicinity of Spartina, near Sergeant Bluff, Iowa. In captivity the adults are good hidiers, being difficult to find in a cage until they move, and they only move when much annoyed. They stand on grass blades or other perch with the head pointing upwards and will sidestep when disturbed, flying only as a last resort. In the open they take to wing with a quick, baffling flight which carries them a few feet. They make a dash for shelter, alight on a leaf or twig and whirl to the rear of their perch as quick as a flash. After one such flight they are easily dislodged again, and are not readily taken.

Beyond this note nothing is known of the habits of the adults, but they are evidently nocturnal fliers, judging from sundry observations.

Oviposition doubtless occurs soon after the emergence of the moths and studies of the Spartina heads indicate that the period of oviposition covers several weeks. The same seasonal causes that would delay the emergence of the moths would also tend to retard the heading out of the Spartina. A supply of glumes in

the proper condition for food for the newly hatched larvæ naturally precedes the hatching of the eggs, and the time of oviposition must coincide with or very closely follow the emergence of the *Spartina* heads.

The antennæ of the moth are, when at rest, carried under the wing, closely appressed to the side of the thorax and reach to about the third abdominal segment. The eyes are in some lights a greenish brown.

No parasites have as yet been reared from *Phalonia spartinana*.

EXPLANATION OF PLATE VI.

Upper right fig.—Adult and empty chrysalids of *Phalonia spartinana*, showing extension of pupa case during emergence ($\times 2\frac{2}{3}$, nearly).

Upper left fig.—Pupa of *P. spartinana* in situ in stem of *Spartina michauxiana* ($\times 3\frac{1}{3}$, nearly).

Lower fig.—Larvæ of *P. spartinana* in situ in lower stem of *Spartina michauxiana* ($\times 3$).

THE ODONATA OF THE RED DEER DISTRICT, ALBERTA.

BY F. C. WHITEHOUSE, RED DEER, ALTA.

While the careful collecting of Dragonflies in the Red Deer District for the past two seasons has failed to produce any notable surprises, or, in fact, a very lengthy list of species, I nevertheless feel that it is not out of place to publish my observations in a district that, so far as this order is concerned, has never been worked before. It is, of course, altogether likely that thorough collecting over a number of years would tend to lengthen the list, but this, in my opinion, would not be to any very appreciable extent.

Red Deer (Canadian zone) is situated on the Red Deer River about half-way between Calgary and Edmonton, and has an altitude of 2,818 feet. The district is well treed with spruce, aspen (*Populus tremuloides*) and balsam-poplar (*Populus balsamifera*). Bordering on the city is a body of water, twenty acres in area, known as Gaetz Lake, and the Waskasoo Creek flows through the town site.

March, 1917

I am much indebted to Dr. E. M. Walker for identifying specimens and giving me much useful advice, and also in looking over this manuscript.

To Mr. C. B. Horsbrugh my sincere thanks are due for practical assistance in the collection of specimens. In this gentleman's ornithological studies he has ranged the district "far and often," and, owing to this careful scouting, the appearance of "something new" has been almost instantly noted.

The list is arranged according to Muttkowski's catalogue of the Odonata of North America, and the *second* numbers refer to pages.

Unless otherwise stated all dates apply to 1916.

Cœnagrionidæ.

LESTINÆ.

1-37 *Lestes congener* Hagen.

Tenerals appeared Aug. 4th, and by Aug. 27 adults were flying in numbers. I took specimens as late as Sept. 24.

A common insect here.

2-37 *Lestes disjunctus* Selys.

July 8, 1 ♂ and 2 ♀ tenerals and others observed. July 13-16, numbers flying; some nearly adult and tenerals. July 22, many adults. August 27, still on the wing. Last date, a single belated ♂, Sept. 14.

Very common.

3-39 *Lestes uncatus* Kirby.

First appearance July 2, a ♂ and 2 ♀ tenerals, and other tenerals seen by a run of still water behind Allen's House. July 5, a ♂.

I do not believe *uncatus* is as scarce as my scanty captures would indicate, but it is certainly the least common *Lestes* in this district. I took an adult ♀ in 1915, which was the first record for Alberta.

4-40 *Lestes unguiculatus* Hagen.

I failed to note the actual first appearance of tenerals. On July 19 I took 5 adult ♂s, and a pair in cop., and by July 22 many adults were on the wing. The insect was flying in numbers at Blackfalds, August 19-25, soon after which the flight apparently ceased. A common insect.

CÆNAGRIONINÆ.

5-55 *Enallagma calverti* Morse.

A number of my 1915 captures were labeled by Dr. Walker "♂ *calverti*" and "♀ *calverti* or *cyathigerum*." The insects seem very similar in appearance, season and habits, but the ♂s appear to differ constantly in the form of the superior appendages. My dates read: teneral ♂s June 7; adult ♂s June 24, and a pair, in alcohol, July 2; both fully adult. Another pair taken in cop., July 23. Common.

6-57 *Enallagma cyathigerum* Charpentier.

On the wing early in June and adult by 24th of that month. I have pairs taken in cop., June 25, July 15, July 16. By 4th week in July principal flight was over, but belated individuals appeared later. I took a ♂ as late as August 27. Common.

7-() *Cænagrion angulatum* E. M. Walker.

On July 4 I took a ♂, fully coloured, at Gaetz Lake, flying with *C. resolutum*. Innisfail, July 6, hundreds flying with *resolutum* by stagnant slough. Red Deer, July 8, Gaetz Lake, ♂ and ♀; July 13, ♂ and ♀; July 19, 2 ♂s; July 22, a ♂. A stagnant slough rather than a considerable body of clear water appears to be the truer habitat of the nymph—which is at present unknown. It was useless to work the slough on the occasion mentioned as heavy rains had fallen. The slough was flooded and all exuviae would have been washed from the reeds. New to the Alberta list.

8-66 *Cænagrion resolutum* Hagen.

First appearance 1916, May 26, tenerals of both sexes. By June 15 in full colour. Numbers in cop., June 25, July 4, July 16, July 19. Shortly after the last date the flight ceased. Common. Gaetz Lake, Red Deer, and Innisfail near stagnant slough.

Æshnidæ.

GOMPHINÆ.

9-85 *Ophiogomphus severus* Hagen.

In 1915 I took a number Aug. 30 to Sept. 7, but more thorough collecting in 1916 proved that *severus* appears in mid-July. My dates are July 13, a teneral ♂; July 14, a ♂; July 17, ♀; July 18, ♀; Aug. 4, 3 ♂s—one a teneral; Aug. 5, ♂ and ♀; Aug. 6, a

number; Aug. 19, a ♀; Aug. 26 Mr. Horsbrugh saw three. Last date Sept. 10, a young ♂.

This dragonfly frequents sandy roads near the river, and rests on the soil frequently. The beautiful light green of the teneral is lost in dried or even alcoholic specimens.

ÆSHNINÆ.

10-110 *Æshna eremita* Scudder.

Nordegg (altitude 4,500 ft., 120 miles west), Aug. 10, a ♂; Sylvan Lake (fifteen miles west), Aug. 14, a ♂; Blackfalds (nine miles north), Aug. 19-25, 3 ♂s; Red Deer, Aug., 24, 4 ♂s; Aug. 27, 2 ♂ and a ♀; Aug. 29, 2 ♀s; Sept. 2, 2 ♂s and 2 ♀s; a number flying in cop., Sept. 9. Last date Sept. 16, a ♂. Appears to be widespread and fairly common. Adult ♀s dimorphic, being blue and black like male, or yellow and brown.

11-112 *Æshna interrupta lineata* E. M. Walker.

First flight of teneral July 1. By July 13 some taken almost adult. July 16 took ♂ and ♀ teneral at Gaetz Lake with their exuviae. The latter half July, all August and first three weeks Sept., *lineata* swarms everywhere, and up to the 4th week in August (when *A. eremita* appears) the ratio of *lineata* to all other *Æshna* would be at least 25 to 1. Frost at night, Oct. 1 to 7; Oct. 8, a ♀ teneral.

Lateral thoracic bands subject to great variation. I have taken ♂s with the upper two-thirds of the second band absent; excepting light terminal spots, and others with both bands *slightly* interrupted.

12-111 *Æshna juncea* Linné.

A ♀ teneral in a glade close to southeast corner Gaetz Lake, August 5. There is nothing extraordinary in this record, for *juncea* has been taken in Alberta previously and might well be expected to occur here, but what seems inexplicable is that careful collecting in the same locality failed to produce others.

13-114 *Æshna sitchensis* Hagen.

Red Deer, a teneral ♂, Aug. 2, and ♂, Aug. 11. Blackfalds (9 miles north), Aug. 21, ♀; Aug. 22, ♂; Aug. 23, a ♀ and 2 ♂s. Last date, Red Deer, Sept. 10, a worn ♂.

On Aug. 6 I searched the reeds at Gaetz Lake for nymphs

but found *A. lineata* only. At Blackfalds, Aug. 23, I took the specimens noted, and saw others (some of which were in cop.) flying over a large muskeg. I incline strongly to the opinion that the true breeding ground of this northern insect is muskeg, which may account for the nymph being still unknown.

14-114 *Æshna umbrosa* E. M. Walker.

Among my 1915 captures Dr. Walker named one *umbrosa*—a ♀. Unfortunately I failed to record data, though it was certainly taken in the Red River District. I naturally expected to take specimens during the past season, but of the dozens of *Æshna* netted for examination, not one *umbrosa*! New to Alberta list, 1915.

Libellulidæ.

CORDULINÆ.

15-128 *Cordulia shurtleffi* Scudder.

Tenerals appeared June 6, both ♂ and ♀; June 8, 6 ♂s and 6 ♀s; June 11, numbers flying; June 17-24, a few still on the wing; July 1, a ♀; July 5, a ♂ and a ♀.

This handsome dragonfly appears to have a very limited season. Practically all the specimens were taken in the sun-lit glades northeast of Gaetz Lake, and I took exuviae in the reeds. New to Alberta list.

16-129 *Somatochlora hudsonica* Hagen.*

I took this insect at one place only, and for a very limited period, viz., flying over a small "run" of still water behind Allen's house, at north end of Gaetz Lake. July 1, 4 ♂s and 1 ♀; July 2, 1 ♂; July 8, 1 ♂; July 9 saw several and took a ♂.

The males never appeared to rest, but the only ♀ taken was while temporarily at rest on a low bush. I conclude the insects were bred in the "run" over which they flew, but when first observed they were adult. Next June I should be able to obtain the nymph, which is at present unknown.

*I sent drawings of the male abdominal appendages of one of this series to Mr. C. H. Kennedy, who wrote me that it was the same as the *S. hudsonica* in the Hagen collection, M. C. Z., Cambridge, Mass. This is not the species figured by Martin as *hudsonica* in Cat. Coll. Selys, XVII, p. 27.—E. M. Walker.

LIBELLULINÆ.

17-139 *Libellula quadrimaculata* Linné.

Tenerals appeared June 8, 1 ♂. On June 11 I saw three and took a ♀; June 15, took 2 ♂s and a ♀; June 17, numbers flying; June 18, reeds at Gaetz Lake full of tenerals with exuviae; June 25, many on the wing; July 5, 2 ♂s; July 9, "none;" July 13, "none;" July 15, 1 ♂; July 16, ♀ (ovipositing); July 23, a few ovipositing; July 29, 2; Aug. 5, a worn ♀; Aug. 6, several very worn ♀s.

It will be noted that while *C. shurtleffi* and *L. quadrimaculata* appear at the same time, the season of the latter is two months, to one month of the former. I once observed a ♀ ovipositing with a mate hovering by. Twice they went into copula for short periods between spells of ovipositing—which, however, she performed alone. New to Alberta list.

18-160 *Sympetrum corruptum* Hagen.

A strangely rare insect considering the length of its season, as shown by the dates of the only five specimens taken in this district in two years, viz., June 20, 1916, Sylvan Lake (Horsbrugh), a ♂ nearly adult; July 8, 1916, Red Deer, a ♂; Aug. 5, 1916, Red Deer, a ♀; mid-Aug., 1915, at Blackfalds, a ♀; Sept. 4, 1915, Red Deer, a ♀ teneral.

Assuming that June 20th specimens had been on the wing since June 15, and the Sept. 4 teneral would have lived until Sept. 15, it would give a season of three months. Four of my captives were taken on roads, and the fifth on a railway grade.

19-161 *Sympetrum costiferum* Hagen.

Aug. 5, a ♀; Aug. 6, a ♀; Aug. 13, many flying alone and in cop.; Aug. 29 to Sept. 24, "numbers," and fresh tenerals. Last date Sept. 30.

Costiferum is probably rather less numerous than either *S. rubicundulum* or *S. scoticum*, but very common nevertheless. It is the last of the genus to appear, but I fancy it may have been on the wing slightly earlier than my first date. New to Alberta list.

20-162 *Sympetrum obtrusum* Hagen.

Dr. Walker named one of my 1915 captives *obtrusum*, and it possibly occurs here in fair numbers. I must confess, however, that I find difficulty in satisfying myself positively by the genital

organs, that specimens which might be *obtrusum* from general appearance (olive green ♀ colouration, white faces, etc.) are anything but *rubicundulum*.

21-163 *Sympetrum rubicundulum decisum* Hagen.

First appearance, 1916, July 2, 2 ♀ teneralis; July 4, a ♀; July 5, 1 ♂ and 3 ♀s—the ♂ showing red; July 8, "a number," and by July 13, common everywhere. Observed in cop., July 16. The main flight of *rubicundulum* was practically over by the end of August, but belated individuals to mid-September.

Yellow-winged ♀s are quite common. I have specimens July 5 to Sept. 10. The colouration varies from light yellow to the brown of a nicotine stain.

22-163 *Sympetrum scoticum* Donovan.

July 17, first flight of teneralis; July 23, "numbers." Teneralis still appearing. Aug. 24, (on which date I took a teneral with exuvia) but by this time many of the earlier flight were black adults. Sept. 2, adults flying in hundreds, and continued during month. Last date Oct. 12.

Scoticum is a very common insect in this district. Ovipositing is performed by rapidly dipping the tip of abdomen in shallow water in the reeds. During the operation the male retains hold by appendages and appears to take an intelligent interest—the pair moving in perfect accord from one patch of open water to another. I have never seen ovipositing performed alone.

23-166 *Leucorrhinia borealis* Hagen.

The first flight of teneralis appeared May 26, and they continued emerging until mid-June, by which time the early insects were adults, and flying in hundreds. By the end of June the numbers had much decreased, but belated individuals dragged well into July—my last record being July 20, 2 ♀s. Mr. Horsbrugh took a teneral at Camrose, May 19. Adult males are blood-red, and old females also take a reddish tinge. Mid-June I took at Gaetz Lake an exuvia with teneral, and a number of exuviae without. The nymph was previously unknown. The insect selects an average height of four or five inches from the water to transform.

24-166 *Leucorrhinia glacialis* Hagen

On July 5, Mr. Horsbrugh took for me at a slough north, across the river, a number of what at first glance appeared to be

L. proxima—which insect we had been taking for the previous ten days. A closer examination of the specimens, however, failed to show any trace of a spot on segment 7, and they were later forwarded "*glacialis*?" to Dr. Walker for determination. This diagnosis he has confirmed.

From my *proxima* dates I judge the season of the allied species to be almost, if not quite, identical—a point well worth further investigation next year. New to Alberta list.

25-166 *Leucorrhinia hudsonica* Selys.

Tenerals appeared with *L. borealis* May 26, and its season is almost identical. By June 17 males are adult and red, and females reddish. The flight wanes in early July—my final records being as follows: July 2, red ♂; July 4, a teneral ♀; July 5, several pairs in cop.; July 9, saw one; July 13, "none;" July 18, a worn ♀; July 29, a young ♂; Aug. 1, a ♂, red and worn.

In June, *hudsonica* is very common, but possibly rather less so than *borealis*, which it closely resembles in everything except size. I took exuviae rather closer to the water than *borealis* selects.

26-167 *Leucorrhinia intacta* Hagen.

On June 24 I took two young ♂s, the twin-spot on segment 7 being bright yellow. July 14, a ♀; July 15, 3 ♀s; July 20, a fine adult ♀.

The above were my total captives. So *intacta* is clearly not common—in fact rather rare. It is also the latest of the genus to appear, being a month behind *borealis* and *hudsonica* and a week behind *proxima* (and *glacialis*?). From my dates it is obvious that for several weeks—say June 24 to 3rd week July—all five *Leucorrhinia* are on the wing together. One of the ♀s taken on July 15, has wings heavily clouded with dirty brown. New to Alberta list.

27-167 *Leucorrhinia proxima* Calvert.

First appearance June 17 when I took a teneral with exuvia, and another, a ♂, next day. June 24, took 2 ♂s, already showing red markings, and a pair in cop., June 25. July 5, several; July 6, 1 ♂; July 23, 2 old ♂s.

Proxima is far less common than *borealis* and *hudsonica* and appears about three weeks later. The nymph was previously unknown. New to Alberta list.

PLAGIODERA VERSICOLORA LAICH.—AN IMPORTED POPLAR AND WILLOW PEST.

BY HARRY B. WEISS AND EDGAR L. DICKERSON,* NEW BRUNSWICK, N.J.

For the past three years the writers have noticed this small, metallic blue beetle infesting poplars in a nursery at Irvington, near Newark, N.J., and since it was first noted at Irvington, it has been observed in several other localities. Mr. Charles Schaeffer (Journal N. Y. Ent. Soc., Dec., 1915) cites several collectors who found it on Staten Island, and Mr. William T. Davis (Ent. News., Mar., 1916) also records it from Staten Island; Mr. George Greene, of Philadelphia, states that he found it at Clifton, Passaic County, N.J., in September, 1915, while the writers noted it in 1915 at Arlington, N.J., and Elizabeth, N.J., as well as Irvington, (Can. Ent., March, 1916, and Ent. News, April, 1916). During the past season—1916—it was also observed at Secaucus, Red Bank and South Paterson. At the latter place the species was found very abundant on willow.

The insect is a European species, and according to Mr. E. A. Schwarz, of Washington, was described by J. N. von Laichartig in Verzeichniss und Beschreibung der Zyroles Insecten, 1781–1784, under the name *versicolora*, which is an older name for the common European *P. armoricæ* of Fabricius. It is interesting to note in passing that Fabricius (Syst. Ent., p. 103) records *P. armoricæ* as occurring on *Ranunculus aquatilis* and *flammula*, which looks as if *P. armoricæ* Fabr. might be a different species, unless perchance the insects fed on willow near water and dropped on the *Ranunculi* from which they were collected. There is further synonymy indicated in the various European records, but that need not be discussed here.

In New Jersey the species has been noted by the writers in greatest numbers at Irvington, in a nursery on poplar and at South Paterson on willow, and the following observations were made at these places, principally at the former.

The beetles came from hibernation in late April or early May, and after feeding began oviposition in early May and continued through the greater part of that month. By early June the adults

*The arrangement of the authors' names has no significance, and indicates neither seniority nor precedence.

March, 1917

of this brood had apparently disappeared and all eggs had hatched. The first adults developing from this brood of eggs were noted June 10, and they continued to develop until the early part of July. The first eggs were deposited by the second brood of beetles about July first and oviposition continued until the early part of August. The adults developing from this brood of eggs began to appear in the latter part of July and continued to develop until late August, after which time, after feeding and copulating, they disappeared from the plants, having gone into hibernation.

Hibernation, according to Messrs. Leng and Davis occurs under the loose bark or in crevices in the bark, as they have found them abundantly in such situations on Staten Island. Mr. Leng states that while collecting *Parnida* in a pond at Bull's Head, Staten Island, he picked up a piece of willow bark in the water and found several specimens of this species attached to it.

It will thus be seen that there were three broods of beetles during the season, a hibernating brood which appeared in spring and continued in evidence during May, a second brood which began to be in evidence about June 10 and continued to appear until well along in July, by which time the third brood of beetles had begun to mature, and this brood continued in evidence until late August or early September. Thus there were two complete broods of insects in addition to the hibernating beetles. Owing to the fact that the insects apparently lived for some time after maturing, and that the period of oviposition of a given brood extended for some time, with a resulting irregularity in development, there was more or less overlapping of the broods.

It will also be noted from the foregoing record that it required about a month's time for the insects to mature, but this will probably vary a few days one way or the other depending upon conditions of temperature, food, etc. The length of the egg stage varied from three to five days, and the early stages of the larvæ were observed to occupy about the same length of time, while the period of pupation consumed two to three days.

The eggs of this species are laid in somewhat irregular masses, more or less circular or oval in outline and, almost without exception, on the underside of the leaves. Usually only one mass occurs on a leaf but occasionally there may be two, and they are situated

on either side of the midrib near the centre of the leaf. The individual egg is lemon yellow in colour with an apparently smooth surface. It is elliptical or narrowly oval in outline with broadly rounded extremities and measures 0.95 mm. long by 0.45 mm.—0.55 mm. broad. Each egg is attached to the leaf surface at one of its extremities and inclined usually at an angle of 30 degrees. At the attached end there is a thin, irregularly disc-shaped expanse of material which fastens the egg to the leaf surface. A number of egg masses were observed and the numbers of eggs in 22 masses were counted with the following results:

Maximum number.....	30
Minimum “.....	12
Average “.....	19+

Two other unusually small masses were noted which contained five and seven eggs respectively.

As the egg matures, the three pairs of dark spots on the thoracic dorsal surface and the dark spots on the abdominal, dorsal and lateral surfaces of the embryonic larva show distinctly through the egg shell. Previous to the emergence of the larva the shell of the egg splits along the lateral surface from the apical end half way, or slightly more, to the base and the larva gradually works its way through this opening. When the larva first emerges, it is dirty white in colour but changes very rapidly on exposure and soon is dark in appearance.

Five larval stages were observed as follows.—*First stage*: recently emerged larva; body elongate tapering posteriorly; general body colour dirty white; head, and dorsal and lateral surfaces of prothorax black, legs and body at outer side of legs dark brown; meso- and metathorax, each with a pair of dorsal black spots and single dorsolateral tubercles. Each abdominal segment marked dark brown as follows: a pair of prominent dorsal spots, a pair of lateral prominent spots, with a smaller dot more or less connecting them, three less prominent transverse ventral spots forming a broken line. On the posterior abdominal segments the dorsal and lateral spots are connected, forming longitudinal bands. Dark spots on dorsal and lateral surfaces bearing one or more fine, comparatively long hairs and the latter also noted on head and thorax. Width of head 0.3 mm.; length of body 0.9 mm. *Second stage*:

somewhat similar to 1st stage, general body colour yellowish brown, dark spots on dorsal surface forming more or less longitudinal lines. Thoracic tubercles more prominent, and two lateral rows of abdominal spots becoming tubercles and dorsal spots on abdomen becoming slight tubercles. Hairy condition of larvæ slightly more pronounced. Width of head 0.4 mm.; length of body 1.7 mm. *Third stage*: similar to second stage save that the colour, with the exception of the legs, is darker, so that the dorsal surface has a brownish appearance with a light, medial dorsal line on the thorax. Tubercles more prominent and slightly roughened. Width of head 0.5 mm.; length of body 2.5 mm. *Fourth stage*, similar to third stage, save that tubercles and colour are slightly more pronounced. Width of head 0.7 mm.; length of body 3 mm. *Fifth stage*: body elongate, tapering at posterior extremity; margins of prothorax, medial dorsal line of thorax and under surface, yellowish brown. Head shining black and bearing several long setæ; front and vertex depressed; prothorax with most of dorsal surface shining, dark brown, lighter medially and laterally; bearing a few setæ on lateral margins; mesothorax brown, lighter medially, on either side of which are two shining, dark brown spots; lateral margin of dorsum has a prominent, dark brown tubercle with two dark brown, shining spots posterior to it and two below it; metathorax similar to mesothorax; abdomen brown, a double row of dark spots on the dorsum, a double row of shining, dark brown tubercles on each side with a single row of dark brown spots between them; under surface of abdomen with five rows of brownish spots, the three median ones lighter than the others; legs shining black; anus surrounded with a prominent, yellowish, fleshy, circular, sucker-like disc. Width of head 0.8 mm.; length of body 5.00 mm.

The tubercles noted on the sides of the thorax and abdomen contain reversible hypodermal glands which are operated when the larvæ is irritated, even in the recently emerged ones. The larvæ of *Plagioderæ* do not respond as readily as do those of *Lina scripta* Fab. which also bear such glands. On the latter species there is a minute drop of liquid exuded which is not the case in *Plagioderæ* and the odor is much more pungent.

The sucker-like disc at the anal end is used by the larva in walking. Even in the recently hatched larva this disc is well de-

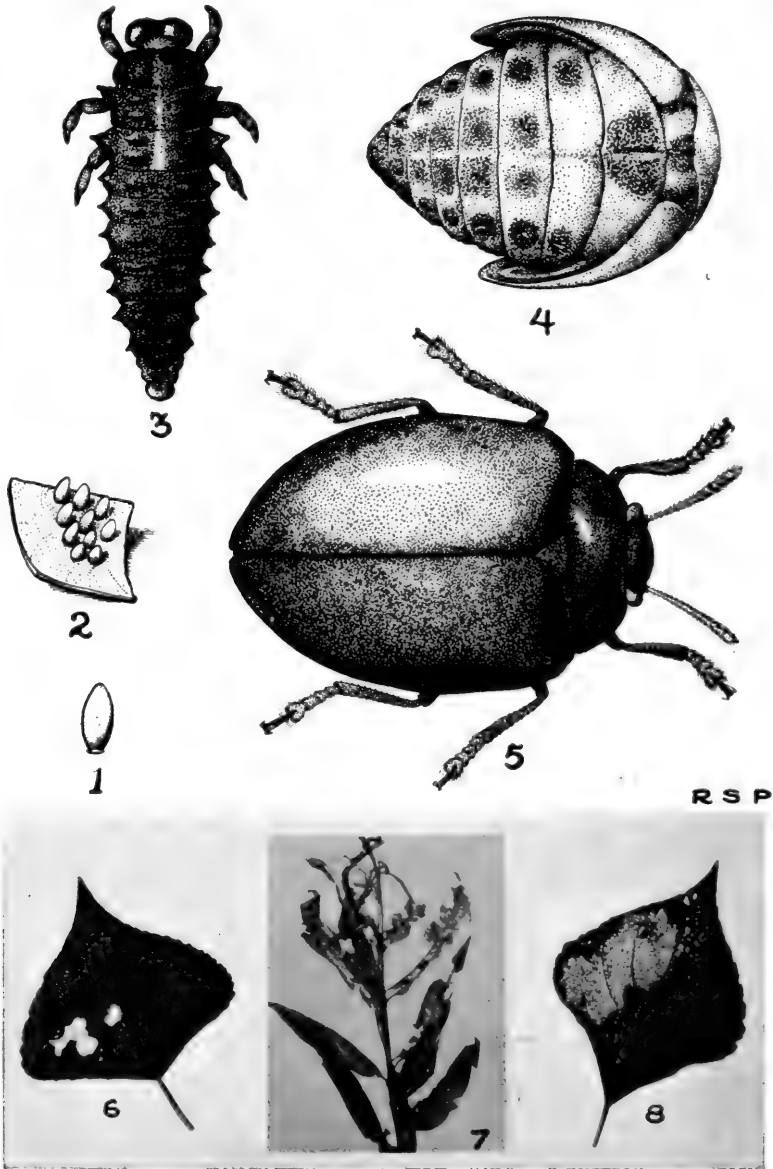
veloped and is quite apparent while the larva is emerging from the egg. It is the principal means of attachment for the newly hatched larva, which is able to hold much more firmly with it than with the legs.

In feeding, the young larvæ are gregarious as a rule and frequently may be observed arranged in the form of a circle or arc with the heads pointed outward. Larval groups of 10, 13, 11 and 16 were thus observed. Later the larvæ spread and usually feed singly. They are found as a rule on the under surface of the leaf but in confinement, and in shady places they were observed sometimes feeding on the upper surface. In feeding, only the epidermis is eaten, and this is in contrast with the adult which consumes all the tissue. At times there did not appear to be as many young larvæ in a group as one would expect from the number of eggs in a mass, and this may be explained by the fact that recently emerged larvæ were observed feeding on eggs which had not yet hatched; three were feeding on one egg, two on another, and two others on one each.

When full grown the larva attaches itself to the leaf, usually the under surface, by means of the sucker-like disc at the anal extremity, and changes to the pupa which rests with its posterior end within the cast skin of the larva from which it could be pulled with little effort. This stage was found to cover a period of two to three days.

The pupa is yellowish brown in colour; meso- and metathorax dark at centre; margin of wing-pads dark; abdomen with a row of broad dark spots on either side of centre, giving the effect of a light, medial, dorsal line; beyond these is a second row of broad, dark spots near the lateral margin. Length 4 mm.; width 2.5 mm.

Certain pupæ were noted which did not rest close to the leaf surface and upon examination these were found to be parasitized. These pupæ were in a more erect position and it was noted that the anterior ventral surface was more or less broken, exposing from two to four parasitic larvæ or pupæ. Parasites bred from such specimens were kindly determined for us by Mr. Girault, of the Bureau of Entomology, as *Cælopisthia rotundiventris* Girault and *Pleurotropis tarsalis* Ashmead, and judging from the condition of the specimens when they were bred, the former is a primary parasite



PLAGIODERA VERSICOLORA LAICH.

(See p. 109)

and the latter a hyperparasite. A number of parasitized pupæ were noted but they were not evidently abundant enough during the past season to form any appreciable check on the insect.

At Paterson, N.J., a number of rather small pupæ were noted. As they were late in developing and undersized it was thought that development might have been affected by parasitism. This proved, however, not to be the case, as beetles were reared from practically all that were collected.

In addition to the parasites a predaceous bug was observed attacking this insect. An adult beetle was found with three nymphs of a species of Heteroptera attached to it. One had the lancets of the beak inserted at the left eye, a second at the tibio-femoral articulation of the left posterior leg, and a third between the last and the preceding ventral segment. At other times dead larvæ were noted and it may be that these also had been attacked by a similar predaceous species.

Owing to the fact that *Lina scripta* Fab. is found associated with this species it is interesting to note some differences between the two. Differences in the glands occurring in the larvæ have already been mentioned, but the larvæ also differ in that *L. scripta* Fab. is somewhat darker than *P. versicolora* and of course attains a larger size. The resulting pupa is also larger than that of *P. versicolora* and hangs from the lower surface of the leaf, attached only at the anal end of the body. The eggs of *L. scripta* Fab. are somewhat similar but the mass is somewhat larger and composed of a larger number of eggs, 60 to 70 having been observed in some masses, while the individual egg is larger and of a light lemon-yellow colour.

EXPLANATION OF PLATE VII.

- Fig. 1. Egg.
- Fig. 2. Small egg mass.
- Fig. 3. Fifth stage larva.
- Fig. 4. Dorsal view of pupa with wing-pads slightly extended.
- Fig. 5. Adult, *Plagioderia versicolora*.
- Fig. 6. Lombardy poplar leaf, showing beetle feeding. (Photo by H. Hornig.)
- Fig. 7. Willow foliage injured by beetles and larvæ.
- Fig. 8. Lombardy poplar leaf, showing larvæ feeding. (Photo by H. Hornig.)

TWO NEW GENERA OF NORTH AMERICAN
ENTEDONINÆ (CHALCID-FLIES).

BY A. A. GIRAULT, GLENNDALE, MD.

Elachertodomyia, new genus.*Type*.—*Secodes phlæotribi* Ashmead.

Tarsi 5-jointed; hind tibial spurs double; antennæ inserted slightly above the ventral ends of the eyes, 13-jointed, 3 ring, 5 funicle joints, the three club joints not very distinctly divided, especially the small last, the latter without a terminal spine. Funicle joints all somewhat wider than long, the first longest, slightly shorter than the normal pedicel. Head rounded from cephalic aspect. Venation normal, the marginal vein a little over two-thirds the length of the submarginal, the postmarginal elongate, nearly as long as the marginal, twice the length of the short stigmal, the stigma being larger than usual. Several lines of the fine discal ciliation, notably one from the stigma to blade apex, regular and distinct. Parapsidal furrows distinct. Propodeum short. Scutum long. Scutellum subquadrate, its lateral margins delicately indented, appearing as lateral, grooved lines but not these as usually understood. Scutellum with not more than four bristles. Strigil strong, the cephalic tibial spur forked. Propodeum with a weak median carina. The original description of the genotype is correct. Its body is scaly.

From the female type of genotype, now remounted on a tag in the U. S. National Museum, the antennæ, a fore wing, a middle tarsus and a hind leg together on a slide.

This genus is certainly very anomalous. I doubt if it is an eulophid, because of its two hind tibial spurs, the forked tibial spur of the cephalic legs and the five tarsal joints.

Emersonopsis, new genus.*Type*.—*Entedon arizonensis* Ashmead.

Original description correct. All the tarsi concolorous. Antennæ 9-jointed with two rather large ring-joints, the club 3-jointed, the funicle 2-jointed, club with a short, terminal nipple. Pedicel much longer than wide, slightly longer than funicle 1; funicle 2 subglobular. Postmarginal vein shorter than the very short, sessile stigmal. Propodeum medially produced into a neck like the abdominal petiole, the latter very short and ventrad of the

former. Propodeum with a broad, smooth, median carina which runs only to the base of the neck; on each side of it a flat groove which is densely, finely scabrous like the surface of the neck, and bounded by a delicate carina laterad; a quadrate area laterad of this carina is divided obliquely into a glabrous half-area (cephalomesad) and a half-area which is foveo-sulcate; this is really formed by a lateral groove narrowing mesad which extends laterad from the apex of the groove alongside the median carina, and then cephalad to a point just mesad of the spiracle; therefore, there is a lateral carina which forms the lateral and caudal margins of this groove, and extends besides some distance down the neck of the propodeum. This groove really encircles (cephalad) the spiracle. Hind coxæ scaly (dorsal aspect). Face with a X-shaped suture, the point of crossing at about the apex of the scrobes, scaly ventro-laterad of each antenna. The latter are inserted at about the ends of the eyes. A suture leads from the cephalic ocellus to the point of crossing of the diagonal ones. Occiput finely scaly.

The second segment of the abdomen occupies three-fourths of the surface. The propodeum is nearly as in *Pseudomphale*.

From the female type in the U. S. National Museum on a tag.

Type.—Catalogue No. 13145 U. S. N. M.; plus a slide with antennæ and pair of wings.

THE INSECT COLLECTIONS OF CANADA.

BY A. F. WINN, WESTMOUNT, P.Q.

At the annual meeting of the Entomological Society of Ontario, held at Guelph in November last, instead of adding a presidential address to the already lengthy programme, I made a few remarks on the Insect Collections of Canada, and suggested that it might be of interest not only to the members of the Society but also to many living beyond our borders to know just where the various collections, public and private, are situated and something about what they contain.

The idea seemed to meet with the approval of the meeting, and the Editor was willing to find space in the pages of "The Canadian Entomologist" for a series of articles describing briefly any collections of which data could be obtained; the descriptions might include mention of any notable varieties or types, collec-

tions from out of the way localities, desiderata whether by exchange or otherwise, and perhaps in some cases be illustrated by half-tone cuts of the museum or room in which they are housed.

It is hoped that all our members will co-operate, so that the series, when complete, will really be contributed to by everyone who has a collection. Our Society is unique in having its Branches and individual members scattered over such a wide area, and if this series of articles is helpful in bringing the members from Halifax, N.S., to Victoria, B.C., into closer touch with one another, one of its objects will have been attained.

It seems fitting that the first article should deal with the collections of our Society at its headquarters at Guelph, and the Rev. Dr. Bethune has kindly consented to write it. So far as practicable other articles will appear in order geographically from east to west—the collections in the Maritime Provinces next, followed by the Province of Quebec, and so on westward. It is not at all necessary that the same plan of describing the collections should be adopted throughout the series; on the contrary the more individuality about them the better, but for the benefit of visiting entomologists it is desirable that no collection should be overlooked, and that the owners should not be so modest as to hesitate about having their treasures referred to in print.

At this most critical time in our history every topic discussed leads to the subject of the war, and there is no doubt that when the end comes and peace reigns again there will be a great demand for insect material from Canada, especially from the entomologists of the British Isles, which we will more cheerfully than ever supply if it be in our power. There must also be, unfortunately, scores of enthusiastic collectors in Belgium, in France and in Poland whose homes have been laid waste by the enemy and whose collections have been absolutely destroyed. Of those who return most will, in their spare minutes, turn from their hatred of man to the love of nature and will at once begin to form new collections. To any such, it is hardly necessary to say that the entomologists of Canada will be found ready to send any material they have, or can obtain, that will be of interest in connection with their studies.

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POPULAR AND PRACTICAL ENTOMOLOGY.

COLLECTING WASPS AND BEES.*

BY F. W. L. SLADEN, OTTAWA, ONT.

By general consent the Hymenoptera are considered to be the highest order of insects, that is, the most specialized, adaptable and highly organized in the adult state; and the stinging Hymenoptera, consisting of the ants, wasps and bees are the highest section. Yet, although these insects are conspicuous, abundant and easily preserved, this is one of the neglected orders. It is true there are some "critical" groups, especially among the bees, but in many genera the species can be separated easily. During the past four years, the writer has been working at the wasps and bees of the National Collection of Canada, during time that he could spare from his apicultural duties; first, examining and separating into species the material found in the collection and, second, losing no opportunity to collect specimens, both in the Ottawa district and during his annual tour of the provinces. Sufficient material has now been accumulated, chiefly by collecting, to start making keys to the species in hand, and several genera have already been thus dealt with.

Beginners often find it hard to separate the males from the females. The best distinguishing character is to be found in the antennæ, which are thirteen-jointed in the males (only twelve-jointed in some species of the wasp genus *Crabro*) and twelve-jointed in the females; the first joint (scape) is very long, the second joint is very short, and in the bee-genus *Nomada* scarcely discernible. Further, in the males the abdomen normally has seven segments exposed, but in the females only six. However, in some genera one or two of the apical segments are covered in both sexes. The chitinous genitalia of the male are replaced in the female by the sting.

*Part of this paper was read at a meeting of the Quebec Branch of the Entomological Society of Ontario, at Montreal on Nov. 16, 1916.

The wasps are predatory, choosing as their victims spiders, flies, ants, caterpillars, etc., according to the genus. The great army of the bees has made an alliance with the flowers, cross-pollinating them in return for food of the richest and daintiest kind—pollen for the nurture of their young, aromatically flavoured nectars for their own delectation. There are many instances of certain species of bees associating only with certain species of plants. In the bees the body hairs are branched or plumose and gather up the pollen dust from the flowers they frequent, and they have beautifully adapted apparatus, becoming more intricate and perfect in the more specialized families, on their hind legs—and in one group (the leaf-cutter bees) on the underside of the abdomen—for collecting this pollen. In the wasps the body hairs are unbranched.

No species of bee runs riot, multiplying by millions under favourable conditions like certain insects in other orders, for the interesting reason that from nearly every genus in which are found species that by dint of special vigour or adaptability are inclined to overproduction, there has sprung a non-industrious genus, the species of which prey on the abundant industrious species, laying their eggs in their nests. The parasite, when it hatches, usually consumes both the host egg or larva and also its store of food, but in case of the semi-social bumble-bees, the parent parasite lives in the nest, producing young which the host workers tend and feed as they do their own brothers and sisters. As parasitic genera in all stages of separation from the host genus occur, we have here presented one of the most attractive and promising fields of study for the evolutionist that can be found. In some cases the parasite has drifted from its original host and has taken up with another. In general, the parasitic genera are less hairy than their hosts, and their tegumental colours are brighter. The bumble-bee parasites closely mimic their hosts and have so much structural similarity to them that they must have developed their parasitism comparatively recently.

In Canada by far the richest regions in species of wasps and bees are certain localities near and reaching to the southern borders. Three very rich localities can be distinguished. One of these is in Old Ontario, especially the region south of Toronto. Another,

probably one of the richest in the Dominion, is in the dry belt of Southern Alberta. The third is at low altitudes in the dry interior of British Columbia, especially its southern end. Most of the species peculiar to these regions are restricted to special habitats, of which the most important are sand hills or sandy or gravelly slopes or cliffs facing south on the shores of lakes or rivers, or in valleys, and some species are found only on certain flowers. The most productive single day's collecting I have obtained in Canada was at Medicine Hat, on August 21, 1916, on the summit of gravelly bluffs on the north side of the river. The captures would have been in better condition had I taken them two weeks earlier.

Coming second in productiveness are localities like South-western Quebec, Southern Manitoba, the Arrow Lakes and Victoria, B.C. On the sea cliffs bordering Beacon Hill Park at Victoria I made some good captures on August 15, 1916, although fifty yards from the edge of the cliff nothing of interest could be found. Such places as Banff and Athalmer in the Eastern Rockies must not be omitted. At places like Banff and Kaslo (which is richer) we get a mixture of boreal and southern species, and representatives of the bee-genus *Osmia* are especially abundant in spring. At Banff and Lillooet eastern forms are also found.

Passing northwards beyond these special localities, we enter into the boreal zone where the species are much less numerous and are very widely distributed. Many of the species of *Vespa*, *Megachile* and other genera stretch across the continent from the Atlantic to the Pacific practically unchanged. Many other species, including the majority of *Bombus*, will stretch from the Atlantic to the mountains of British Columbia, there to be replaced by mountain or costal species.

The coast of Nova Scotia, including the Annapolis Valley, and also the lower mainland of British Columbia, including Vancouver and its environs, have not so far proved particularly rich in species. They are essentially boreal, even more so than the south and east coasts of England.

While wasps and bees can be caught in plenty on any warm day in spring or summer, there is a pageant of newly appearing species from early spring until well on in the autumn. There are two seasons at which the number of species to be found in good

condition is much greater than at others. The first is in the spring, starting with the first fine days as soon as the willows are in bloom, at which flowers and others, numerous species of the bee genera *Andrena*, *Osmia* and *Halictus* swarm. This is the time when the beautiful, large queen bumble-bees can be secured in fresh and unfaded condition. These early insects belong to two classes; those like *Andrena* and *Osmia* that have reached the adult stage the previous autumn, but have deferred emergence until spring, and those like *Bombus*, *Halictus* and *Vespa*, consisting of females only, that have hibernated and left their mates to die before winter. After a lull in June the great summer procession begins, and it goes on until the middle of August. The species are now more numerous, but the specimens less plentiful than in spring, so that searching in choice habitats will usually prove very productive. These summer fliers have mostly passed the winter in the full-fed larval stage.

A few notes about killing and mounting wasps and bees may be helpful. A cyanide bottle is usually satisfactory for killing if used with care. It should contain plenty of dry blotting paper or other absorbent to prevent specimens rolling about and thus damaging their coats with moisture, and the specimens should not be allowed to touch the cyanide, and should be removed within one or two hours to avoid the reddening of the yellow tegumental markings by the cyanide.

On a collecting excursion, lasting several days, the specimens may be laid between layers of cotton batting in cigar boxes, and may be relaxed and mounted in the autumn. To mount them, use a No. 3 steel pin for all moderate or large-sized specimens, and a No. 2 for all small ones, except the very smallest, which may be mounted on small, triangular strips of cardboard with glue or fine points, the cardboard being run on to No. 3 pins. Avoid using No. 1 pins. In the quick handling of dried specimens mounted on these, the abdomen is very likely to fly off and the pin may bend; also use store boxes lined with deep, soft material such as pith, not thin hard cork or linoleum. Do not trouble to spread the wings, it is hard and costs much time to do this satisfactorily, and where it is attempted the specimens take up a great deal of room, but see that the propodeum (metathorax) and base of the abdomen are

exposed well to view. In some genera it is important to open the mandibles and expose the male genitalia. Any such treatment is always better accomplished in relaxed specimens than in fresh ones, the parts in the latter tending to return to their former positions. Every specimen should be labelled with the date and locality of capture, and the collector's name written or printed in very small, clear letters on a small, white card. Collect preferably only newly emerged, unfaded specimens, not dusted with pollen, and do not be afraid to make a large collection. How pleasantly the collector can spend an hour now and then during our long winter, arranging the summer's material into species, according to similarities in sculpture and livery, guided by nature, musing the while on the possible value to the species of some remarkable structures or pattern of colours! A study of the insects in the field, or of their marvellously diverse and interesting nesting habits, will confute or endorse many a theory thus formed.

SOME DRAGONFLIES FROM PRINCE EDWARD ISLAND.

BY E. M. WALKER, TORONTO.

Somewhat more than a year ago I received from Dr. A. G. Huntsman, Curator of the Dominion Biological Station, St. Andrews, N.B., a number of dragonflies, including a few nymphs, which he very kindly collected for me during a few days spent in Prince Edward Island in the summer of 1915.

Hitherto there have been apparently no records of dragonflies from this Province, so that, although the number of species listed here is small, and doubtless represents but a fraction of the Odonate fauna of this island, it seems worth while to record them.

All of the species are widely distributed, and with one exception all could have been predicted almost with certainty to occur in this region.

The localities and dates of collection are as follows:—

Charlottetown, pond in Victoria Park, Aug. 3.

Souris, pond on New Harmony Road, Aug. 1.

Little Harbour, near Souris, Aug. 14.

Souris, Sept. 5.

Rollo Bay, Aug. 21.

April, 1917

1. *Lestes congener* Hag. Eleven nymphs, 8 full grown and 3 belonging to the penultimate stage, were taken from the pond on New Harmony Road, Souris.

2. *Lestes unguiculatus* Hagen. Charlottetown, 2 ♂s, 1 ♀; New Harmony Road, Souris, several nymphs from the pond, probably belonging to this species.

3. *Lestes uncatus* Kirby. Charlottetown, 1 ♂.

4. *Lestes disjunctus* Selys. Charlottetown, 1 ♂, 1 ♀; Little Harbour, Souris, 2 ♂s, 4 ♀s; Rollo Bay, 1 ♀.

These four species of *Lestes* seem to be generally distributed in the Canadian and Transition zones from Atlantic to Pacific. It will be noticed that the same four species and no others are included in Mr. Whitehouse's list from Red Deer, Alta., (Can. Ent., vol. XLIX, 1917, p. 96).

5. *Nehalennia irene* Hagen. New Harmony Road, Souris, 1 ♂.

6. *Ischnura verticalis* Say. New Harmony Road, 1 ♀; Little Harbour, Souris, 6 ♂s, 7 ♀s; Rollo Bay, 2 ♂s, 6 ♀s.

One of the males from Souris is somewhat teneral, the others are fully mature, the females all pruinose.

7. *Enallagma hageni* Selys. Charlottetown, 2 ♂s; New Harmony Road, 3 ♀s; Little Harbour, 8 ♂s.

This and the preceding two species are unknown in the western half of the continent; Nos. 5 and 7 ranging into Manitoba, while No. 6 has not been taken in Canada, west of Nipigon, Ont.

8. *Enallagma civile* Hagen. Souris, Sept. 5, 1 ♂ in full colour.

This is chiefly a western species, and is rare in Canada. Its occurrence in Prince Edward Island was unexpected, although there is an old record of its capture in Quebec. I have also received it from Manitoba.

9. *Æshna interrupta interrupta* E. Walker. Little Harbour, 1 ♂. The spots formed by the interrupted lateral thoracic bands are rather large and rounded, though completely separated. New Harmony Road, one full-grown female nymph.

10. *Æshna umbrosa* E. Walker. Charlottetown, fragments of two male exuviae from pond, apparently this species; New Harmony Road, one ♂ exuvia and four very young nymphs.

11. *Somatochlora elongata* Scudd. Rollo Bay, 1 ♂. Not known west of Wisconsin.

12. *Libellula quadrimaculata* L. Charlottetown, 3 ♂s; New Harmony Road, 4 nymphs, two belonging to the penultimate stage, the others younger.

13. *Sympetrum obtrusum* Hagen. Charlottetown, 5 ♂s, 2 ♀s, two of the ♂s recently emerged; Little Harbour, 2 ♂s; New Harmony Road, 1 full-grown nymph.

14. *Sympetrum rubicundulum* Selys. Charlottetown, 3 ♂s; Little Harbour, 1 ♂, New Harmony Road, 1 ♂ 3 ♀s., all teneral.

15. *Leucorrhinia hudsonica* Selys. New Harmony Road, 2 nymphs, penultimate and ante-penultimate stages.

This and the preceding three species are transcontinental species, *L. hudsonica* being confined to the boreal region.

16. *Leucorrhinia intacta* Hagen. New Harmony Road, one nymph of the penultimate stage apparently belonging to this species. Another similar younger nymph was also found.

Distributed as far west as Alberta, (see Mr. Whitehouse's list, Can. Ent., vol. XLIX, p. 96.) but not common in the Canadian Zone.

THE STATUS OF *LECANIUM CORNI* BOUCHE IN NEW JERSEY (HOMOP.)

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

This insect is undoubtedly the best recorded of all the species listed in Smith's "Insects of New Jersey," inasmuch as it appears at least eleven times disguised under as many synonyms. J. G. Sanders, in his paper, "The Identity and Synonymy of Some of Our Soft Scale Insects," (Jour. Econ. Ent., 1909, p. 428) mentions 41 or 42 synonyms of *Lecanium corni* Bouche, and eleven of them managed to appear in Smith's list.

Sanders states that it is widely distributed in North America, the most important hosts being plum, peach, apricot, pear, currant, blackberry, mulberry, osage orange, elm, ash, linden, pecan, maple, Cornus, etc. It also occurs in Europe in greenhouses on peach and grape and outside on various plants including currants, goose-

berries, raspberries, Cotoneaster, Corylus, Boxwood, Thuya, Viburnum, locust. It has been found recently in New Jersey on boxwood in nurseries at Rutherford, Elizabeth and Riverton, evidently having been imported from Holland on such stock within the last few years inasmuch as it is sometimes reported by inspectors examining imported boxwoods.

It has been correctly recorded from New Jersey in "Entomological News," vol. XXVI, p. 102, where it appears as *Lecanium corni* Bouche, although nothing is said there concerning its synonyms, and the only host mentioned is boxwood. In Smith's list it appears as follows under the genus *Eulecanium*:

E. armeniacum Craw. The apricot scale; found also on plum, pear, cherry, peach, etc., but not abundantly enough to be injurious.

E. canadense Ckll. Mass. to Ohio on elm, maple, oak, hickory and peach, and should be found in New Jersey.

E. cerasifex Fitch. New York plum scale. On cherry, plum, peach, apple, pear, etc.; not common nor injurious in New Jersey.

E. corylifex Fitch. On Corylus and Viburnum.

E. cynosbati Fitch. On gooseberry and Gleditschia.

E. fitchii Sign. Found in N. Y. on raspberry and blackberry.

E. juglandifex Fitch. The butternut scale.

E. kingii Ckll. On sassafras and *Vaccinium corymbosum* in Mass. and Conn.

E. lintneri Ckll. & Benn. On sassafras in N. Y. and probably in N. J.

E. pyri Schr. On pear, apple, hickory and white thorn.

E. ribis Fitch. The "currant scale." Found on currant, gooseberry, mulberry, etc.

While all of the above are not strictly New Jersey records, it is evident that the species occurs on various hosts within the State, but never in sufficient numbers to be injurious. This condition of affairs, true at a time when the list was prepared, still holds good. If anything, this particular scale can be said to be rather rare in New Jersey at the present, and at no time was it ever abundant enough to require the application of remedial measures.





PAPAIPEMA POLYMNIE AND P. ERYNGII. (See p. 128.)

NEW SPECIES AND HISTORIES IN PAPAIPEMA
SM. (LEPIDOPTERA.) NO. 19.

BY HENRY BIRD, RYE, N.Y.

With the hope of further disclosures under this heading, an investigation of the flora in the vicinity of Washington, D.C., was undertaken in June, 1915. *Papaipema nephrasyntheta* Dyar, described from this locality and unknown in the larval stage was particularly in mind, but results for this species were unsuccessful. The perennial plant life showed some departure from that of the latitude of New York, one instance of easy notice occurring with *Polymnia uvedalia* L. At the first occurrence of this plant a contained larva was noted, and it seemed different from any of the congeners. While conspicuous on account of size, but few examples of the plant were found, and only six larvæ resulted from the search of that year. After observing several of the larval stages, it was evident an unknown one had been discovered, but it seemed too small to be the wished-for desideratum. Eventualities claimed all of these larvæ prior to pupation, so it remained for a search in 1916 to uncover a sufficient number in late July, when near maturity, whereby a convincing series of adults came to hand. Though the departures with the adult are slight, with the sum of evidence it is very clear an undescribed species is involved. From the fact the genus *Polymnia* is restricted to America, in itself suggestive of a possibly ancient relation between the two, and because of it clearly proving to be a preferred food plant in the faunal area where discovered, we propose as a name:

***Papaipema polymniæ*, n. sp.**

Head generically normal and smooth on frons; heavily clothed with long, erect scales of brownish colour mixed with grey and pervaded with a purplish tone, which colouring holds for the entire thoracic vestiture. At the base of the antenna a ring of light, but not pure white scales occur; the antennæ are simple, under magnification showing minute cilia and with scarcely any sexual disparity. The thorax is heavily clothed, the collar margined above with yellowish usually; the erect, spreading anterior thoracic tuft of the normal pattern; the tegulæ more or less powdered with yellow; the posterior tufts prominent and spreading; legs have long hairs on femur, the fore- without, the mid- with one pair, and the hind

tibia with two pairs of spines; the tarsus ringed faintly at the joints with light scales.

Fore wing: basal area, median field and terminal space brassy yellow which may be said to be the pervading colour, the purple-brown body-colour appearing as minute powderings, sometimes in the terminal space obliterating the yellow, except at the apex. the ante- and post-median areas purplish, tempered by the body brown, becoming more bluish in some specimens and exhibiting a glistening sheen especially in the outer area. Maculation of the usual pattern but not sharply drawn; basal line vague, except as it outlines the basal spots which are yellow and never white; ante-medial line brown, sinuous, extending close to the claviform, below which, at the submedian vein, it outcurves to the inner margin; median shade-line occasionally traceable as an angled brownish shading, best defined in the lower median field; the post-median line geminate, the inner brown, the outer dull purplish, outcurved over the cell, thence incurved with a nearly full ogee sweep to the inner margin. The sub-terminal is very irregular, paralleling in a way the outer margin, and consists of a series of dentations running outward on the veins in little points. It defines the terminal area with a glistening boundary that is not, however, very contrasting. The fringes are slightly dentate, dull purplish and glistening. The stigmata are of the usual formation, but not large; the orbicular is rounded, white, with a yellow scale at centre; claviform double, two spots in line with the orbicular, the upper minute and occasionally yellow, the lower white. The reniform consists of a lunulate, yellow marking around which are a number of small spots clustered in the usual manner and cut by the veins, the innermost usually white, the outer one yellow. The secondaries are smoky-brown, shaded darker at the outer margin. The abdomen is of similar hue. Expanse 32 to 43 mm.

The male genitalia are generically typical and offer no particular specific feature. The corona is more fully rounded than most of the allies, with the pollex prolonged prominently and at right angles to the costa, and this section of the valva heavily spinose, as is customary. At the clavus, or perhaps better defined as the anterior margin of the sacculus, a patch of dense setæ occurs.

Habitat.—Washington, D.C., and its immediate environs; a

specimen from the Black Mountains, N.C., (W. Beutenmuller), also a pair from Elizabeth, N.J., (O. Buchholz), are referred to this species. Type locality, Roslyn, Va. A male type is with the author, also four paratypes which may later be distributed. In coloration the species is near *cataphracta*, indeed were the early stages unknown it would easily pass as the white-marked variety *cataphracta fluxa*. In the structure of the genitalia it seems nearest *mericcata* and may find a serial position near that species.

Polymnia larvæ do not depart from the typical feeding habits. The hibernated ova doubtless hatch about the last week of May, and the plant is entered well up the stem at some tender point. When in luxuriant plants, whose height attains seven feet at times, the gallery is at some midway portion; in small plants it may finally reach the root crown by maturity. While the stem has a slight hollow core and though the walls are heavy, feeding continues at one point long enough for the plant to produce a noticeable swelling that gives ready intimation of a contained host. No parasites were encountered, but a heavy mortality resulted from fungus infection, probably the same as occurs with *speciosissima*, as the coloration and effects seem identical. The gallery is abandoned at maturity, and in confinement a pupal cell is formed about two inches underground. Larvæ, at the latitude of Washington, leave the plants Aug. 1 to 10.

Larval observations have been made from June 15 onward, and the following instars noted.

Stage IV.—Head polished, honey yellow, obliquely marked at ocelli with a black line; body colour pale brown, with a more or less pinkish tone. The dorsal is a continuous stripe from cervical shield to anal plate; the sub-dorsal and sub-stigmatal are continuous on thoracic segments to the middle of joint three, thence interrupted to the middle of joint seven where it continues to the plates of joint thirteen, this break being productive of the girdled appearance common to the genus. These markings are yellowish white, the sub-stigmatal on the abdominal joints merging into the yellow white of these segments ventrally. Cervical shield laterally edged with black; anal plates conspicuous; tubercles well defined though small, all excepting IV smaller than a spiracle. On joint ten there is evidence of IVa forming.

Stage V.—Structurally similar, but colour much darker, frequently a deep purple brown with the stripes showing very contrastingly. On joint ten IVa is well developed, though not bearing seta, as does IV.

Stage VI.—Colour fades to dull pink, the pale yellow lines wide and conspicuous. Tubercles I and II become more prominent, especially on joint eleven; and on twelve their mergence into a single plate preceding the anal shield, is even of greater definition.

Maturity.—The full-grown larva is normal for the group, though rather robust as compared with the resultant moth. The lines become vague and the general tone a yellowish translucence, with the brown plates at the tubercles conspicuous when they are larger than the black spiracle. The single seta they bear is scarcely discernible except with a lens. The head assumes a darker hue, and the anal plate becomes heavier and nearly black. Tubercle IVa on joint ten seems never to bear setæ. Larval lengths for the stages: 27, 33, 40 and 47 mm. respectively.

The pupa shows no departure from normal. It is polished brown, the shell of rather thin texture so that the white stigmata of the primaries may be discerned a week prior to emergence. Fungus claimed a large percentage whether left in the earthen cell or removed and given antiseptic treatment. Thus the assumption arises that infection occurs while the larva is yet feeding. The pupal period is about four weeks; emergence dates for the series bred, Sept. 3 to 23.

One of the first plants to attract attention while examining the flora of the Chicago Plain in 1915, was *Eryngium aquaticum* L., one of those anomalous denizens of this area which subsist equally well through great extremes of moisture, or of dryness. We were under the able guidance of local entomologists, Messrs. A. Kwiat and E. Beer at the time, and remarked this one seemed favourable for tenanting a *Papaipema*, its Yucca-like foliage suggesting something quite different from the usual line of food plants. Should such an one be selected, the associate might be expected to show some departure from the customary type, and our enquiry if this plant had been followed up previously elicited the reply that numerous observations of it the preceding year were negative in result. At a momentary pause, Mr. Beer devoted himself to several

plants in the foreground, and was successful in finding, in the crown of the taproot, a penultimate stage *Papaipema* larva, close to *P. cerussata*, yet differing in one important detail. As this discovery happened early, the remainder of the time allotted the trip gave opportunity for securing a representation, and ultimately the details at hand show a distinct and undescribed species. While it would be fitting to honour the discoverer, our confreres consider it will be more helpful to call the species suggestively:

***Papaipema eryngii*, n. sp.**

Head smooth on frons and similar to the preceding species, except that the colour is a darker purple, as is also the body tufting. The upper tarsal joints on all legs are prominently ringed with white in this instance. Fore wing: at the extreme base a white dot; the usual basal spots conspicuous and yellowish to pure white; the ante-, post-median and terminal areas are rich purple brown; the median field dark castaneous to red brown, becoming lighter near the inner margin where it shows yellow powderings; near the apex a powdery yellow patch prevails. The lines follow the characteristic courses, as with the preceding, are ill defined, and except for the large and brightly white-marked stigmata, there would be little contrast. The post-medial line is drawn sinuately from a prominent yellow spot on the costa above reniform outward in an uneven sweep past that marking, thence obliquely and irregularly to the inner margin. The subterminal line is vague, a broken sprinkling of yellow scales defining a boundary of adjacent areas that are for the most part concolorous. The reniform is comparatively large, a central yellowish lunulate line is surrounded by seven white spots; the orbicular and claviform appear as an equally pronounced marking and consist of three superimposed white spots, the claviform being divided into two, the upper of which is smallest and stained with yellow. Several white dots appear on the costa, and one outside the basal spots; fringes slightly dentate. The hind wing is a dull, smoky fawn, sometimes assuming a rosy tint and overlaid with dark purplish powderings, deepening near the margin into a vague sub-terminal shading, and occasionally an outer line may be discerned. Beneath, the wings are deeply powdered with smoky purple. Expanse 35 to 48 mm.

The male genitalia exhibit in this case a good instance of specific individuality. This modification exists in the terminal character of the clasp, with the harpe, a stout sickle-shaped member, larger than in any ally. Instead of the produced costal angle at the corona, the margin terminates squarely and is prolonged below into a curved hook or pollex; this section of the valva heavily spinose as usual. The harpe arises in close juxtaposition and exceeds the pollex so that these two points, unique in their nearness, may be seen in the specimen without preparation of the parts.

Habitat.—The type locality is the prairie environs of Chicago, Ill., and the species doubtless enjoys a wide range through the prairie zone supporting the food plant, though it has thus far eluded collectors, apparently. A large series of bred specimens are under observation, and a number have been labelled "paratype" as representative for several collections. A male type and several further paratypes remain with the author. Variation in ground colour runs from a dark, almost blackish-purple, powdery effect to an even, rich, reddish tone, while one of the series showed the stigmata much reduced. These conspicuous white markings, inclusive also of the basal spots, are similar with *marginidens* and *nephrasyntheta*, with a strong superficiality in the direction of the latter. The larval features denote a relationship to *cerussata*, while the genitalia denote a proximity with Californian species in one direction, which might not be unexpected, as the food plant is generically more at home in the Southwest.

The character of this food plant is such that the entry and future operations of the larva produce little evidence along the usual lines suggestive of *Papaipema* work. The egg overwinters and the young larva emerges about the first of June. A conspicuous amount of frass is thrown out, but may be hidden in the cluster of close-lying leaves which by reason of their spined edges are not pleasant to handle. The flowering stem is mined to some extent, though most of the work is in the root-crown, the larva working usually in more than one taproot. As old clumps consist of several taproots, this is easy, also one clump may furnish several larvæ and these older plants are invariably selected for oviposition. Fire plays a most important role in the economy of the species, and the early failure of my co-labourers to meet with it was doubt-

less due to this factor. They kindly secured some of the early stages in 1916 which were missed the previous year, and such fullness as this note contains is largely due to their efforts.

Stage IV.—Of the cylindrical type common to the genus. Head honey yellow, mouth parts concolorous, the ocelli only darkly marked. Body of deep purplish brown tone, contrastingly marked by the longitudinal dorsal, sub-dorsal and sub-stigmatal white lines, the latter on the six posterior segments merging ventrally to a concolorous under surface of whitish. These lines are broken on the first four abdominal segments, which appear as a dark girdle completely encircling the larva. The cervical shield sharply bordered with black laterally, with the other plates and tubercles normal. Tubercle IVa on joint ten begins to show definition.

Stage V.—Similar.

Stage VI.—The dark body colour still holds, with the lines which are always broken on the first four abdominal segments, broad and contrastingly drawn in white. Tubercles attain greatest definition in this stage, being black for the most part and those laterally surrounding the spiracles very conspicuous. On joint ten the spiracle is surrounded by five tubercles, III, IIIa, IV and V about the size of the spiracle, while IVa is even larger and very close to the upper corner, caudad; on eleven, III and IIIa are merged into an elongate plate bearing one seta. The anal shield is heavy, rugose and brown—not black. Ventrally a salmon tone prevails that is quite characteristic.

Maturity.—Similar to preceding, the colour lighter but does not fade to the frequent translucence of this instar. Proportionate to the increase in size, the tubercles seem smaller. Observations were from June 14 to Aug. 15, when all larvæ had left the plants to pupate. The duration of stages increases toward maturity with the last instar lasting twelve days in two cases observed. Length of larvæ from the stages, approximately, 34, 39, 45 and 50 mm.

Eryngii larvæ approximate closely *cerussata*, differing in coloration of the last stages, and in having the anal plate brown, whereas it is black with the latter.

The burrow seems to be deserted generally for pupation, but two instances occurred in confinement where this was not so.

The pupa is robust, dark shelled, and active; the frons is in no way produced, the thoracic region and wing-covers rugose, the remainder shining except the interstices of the abdominal sutures which are finely punctured. Two sharp spines occur at the cremaster, and a subsidiary spine occasionally on the last segment laterad.

Average length 23 mm.; diameter 7 mm.

Emergence dates range from Sept. 25 to Oct. 15.

***Papaipema nephrasyntheta* Dyar.**

The unique type of this species has remained in the United States National Museum since its description in 1908 until recently, without a counterpart. In conversation with its captor, Mr. E. A. Schwarz, we learn it was taken at light on Plummer's Island, Md., Sept. 27, 1904.

A second example from the same source and caught at the same time, has recently been placed in the Museum collection and this, though unspread, gives a better idea of the coloration since it is brighter, whereas the type would seem as if it might be somewhat faded. It was at first believed the *Eryngium* feeder was this species, but a careful comparison forces an opposite conclusion. The Dyar species is of a lighter, clay, ground colour, with the central marking of the large white reniform a white lunulate line, an unusual feature in the genus. *Eryngium aquaticum* does not flourish at the type locality, and we incline, with its author, to consider it a close ally of *marginidens*, with the larva yet unknown. Both the specimens at Washington are females, hence the value of genitalic comparisons are not available.

EXPLANATION OF PLATE VIII.

(Figures Natural Size.)

- Fig. 1 *Papaipema polymniæ*, male.
- " 2 *Papaipema polymniæ*, female.
- " 3 *Papaipema polymniæ*, larva, stage IV.
- " 4 *Papaipema polymniæ*, larva, stage V.
- " 5 *Papaipema polymniæ*, larva, mature.
- " 6 *Papaipema eryngii*, male.
- " 7 *Papaipema eryngii*, female.
- " 8 *Papaipema eryngii*, larva, stage IV.
- " 9 *Papaipema eryngii*, larva, stage VI.

THE OCCURRENCE OF THE GENUS *PARACHRYSOCHARIS* GIRAULT IN THE UNITED STATES.

BY A. A. GIRAULT, GLENNTALE, MD.

The following species was found in the collections of the U. S. National Museum:

***Parachrysocharis semiflava*, new species.**

Female.—Length 0.87 mm.

Dark metallic green, the head below the antennæ; the legs, ventral aspect of the abdomen, the scape, the pedicel (except above at basal half), venation and tegula, lemon yellow. Cheeks yellow. Wings hyaline. Head and thorax densely, not very finely scaly. Propodeum distinct, moderately long, tricarinate, the spiracle round, moderate in size. Axillæ much advanced. Mandibles tridentate, the outer tooth largest, widely separated from the middle one, falcate, the third tooth minute. Funicle joints all a half longer than wide. Parapsidal furrows complete, distinct. Club with a distinct terminal nipple. Postmarginal vein very slightly developed. The male seems to be similar but the funicle 4-jointed (no good specimens). Eight females. Austin, Texas, August 16, 1904, (Carl Hartmann).

Types.—Catalogue No. 20803, U. S. National Museum, three females on tags plus a slide with the appendages. There are two ring-joints in this species, the second very short.

THE INSECT DRIFT OF LAKE SHORES.

BY JAMES G. NEEDHAM, ITHACA, N.Y.

During the summer of 1906, while still living in Lake Forest, Illinois, in a pleasant cottage near to the shore of Lake Michigan, I spent all my spare time upon the beach studying the insect accumulations of the shore-line, and trying to settle some of the questions raised by my earlier observations (1900–1904). I visited the beach nearly every day, and collected insects from the drift-line whenever there were any deposited there. Through early and late summer I merely collected when the collecting was good; but during the month of August I made daily careful observations on the insects at the shore-line, and on accompanying conditions of wind, waves and weather. As often happens, I settled a few of my questions and raised many new ones. After waiting ten years

without finding another opportunity for continuing these observations, I have concluded to publish the results. First, I will give the data obtained during August to show the ordinary course of beach collecting (see accompanying table), and then I will add notes on the more abundant species for the entire season.

The shore of Lake Michigan at Lake Forest extends due north and south; hence it is the east wind that deposits drifting insects upon the beach. My observations show that the wind was E.-N.E. when the greatest accumulations of insects occurred. Only once (Monday, Aug. 27th) were there any deposits of insects upon the beach while the wind was blowing from the westward, and at the time of that observation the waves were still running in from N.-N.E., whence the wind had recently shifted.

A number of piers project from the shores, and in the lee of these the flotsam gathers and slowly rotates in isolated broad eddies.

CONDENSED RECORD OF DAILY OBSERVATIONS.

Aug.	Wind.		Flotsam.	Drift.	Abundant forms.
1	N.-N.E.	light	in black patch be- side pier	faint lines on sand.	midges and ladybirds.
2	S.-S.E.	"	in diffuse lines.	almost none	skins of midges and caddis-flies.
3	O.		none.	" "	
4	S.-S.E.	faint.	thin gray layer.	none.	midges.
5	W.	"	none.	"	
6	E.	strong.	"	scattering.	live beetles, etc.
7	O.		"	none.	
8	E.	faint.	thin streaks.	"	skins of midges and caddis-flies.
9	S.W.	moderate.	none.	"	
10	N.-N.E.	"	scanty, gray.	almost none.	
11-17	Observations interrupted.				
18	S.E.	moderate.	little.	none.	
19	W.	"	none.	"	
20	W.	"	"	"	
21	N.W.	"	"	"	
22	N.E.	"	"	scattery-trashy	butterflies, etc.
23	E.-N.E.	strong.	"	abundant, trashy	crickets, etc.
24	E.-N.E.	"	"	"	many forms.
25	S.E.-E.	subsiding.	much.	little.	
26	N.E.	brisk.	none.	much.	grasshoppers, beetles, etc.
27	N.-N.W.	"	much.	"	grasshoppers, butter- flies, etc.
28	W.	gentle.	almost none.	almost none.	
29	W.	moderate.	none.	none.	
30	W.	"	"	"	
31	S.E.-E.	"	"	"	

This flotsam often consists of nearly pure insect material. The most characteristic constituents are the cast skins of may-

flies, midges and caddis-flies, which gather in inconceivably vast numbers, in floating felted mats, that are sometimes an inch or two in thickness, and square rods in area. Every cubic inch of this material represents thousands of specimens. When with shift of wind and rising of waves these mats are cast upon the pier, they cover the planking with a plaster-like coating of ashen-gray hue. There is no place where flotsam can accumulate when the wind blows parallel with the piers, or when the waves break over them.

During the month of August, 1906, there was but one period of abundance of insect drift upon the beach,—a period of three days, the 22–24th inclusive, while the wind was E.-N.E., and following upon warm weather with westerly winds. There were scanty accumulations also on the 1st, 2nd, 6th, 8th, 10th, 25th, 26th, 27th and 28th, always accompanying an easterly wind. Sometimes the drift was a thin line of nearly pure insect remains, scarcely discoverable as a tracing along the sand at the farthest reach of the waves, as on the 1st; sometimes it was a conspicuous line of trash, with insects scattered thinly through the trash, as on the 22nd. On only twelve days of the twenty-four recorded was there any discoverable deposition of insects at the drift-line.

These regular observations supplement earlier more casual ones, and confirm certain opinions as to the occurrence of the drift upon the shore of Lake Michigan as follows:

1. Floating insects can be deposited at the drift-line only when the waves are running shoreward. The wind is, of course, the actuating cause of their transportation by water. The waves follow the wind, but do not quite keep up with its changes. In my notes I find three entries that bear directly upon this:—

“6th Aug.: wind blowing strongly from eastward (it had blown from the west the preceding day). I saw the drift begin to come ashore at close to 7 a.m., bringing in at first many live *Rhynchophora*.”

“22nd Aug.: wind shifted inshore (from N.W.) in afternoon and drift began to appear in the evening. No flotsam; waves too rough.”

“27th Aug.: wind N.-N.W. on land, but waves still running in strongly from N.E.; many grasshoppers.”

2. Deposits of drift vary with the strength of the wind. When too strong, the sand is disturbed and many insects are buried in it. Long, evenly-running waves driven by a steady on-shore breeze give the best deposits.

3. The proportion of insect material in the drift varies with such purely local and accidental causes as the dumpings of straw and ashes from lake steamers, and with many natural causes, the two most important of which seem to me to be:—

(a) Storms, with attendant floods, that carry vast quantities of plant fragments into the lake. Occasionally an abundant accumulation of insects may be entirely hidden amid a still more abundant windrow of this sort of material. Mr. Schwarz once expressed the opinion (1890) that storms have nothing to do with the insect drift; and while it is true that the deposits occur whether there be storms or no, yet I am sure that if an off-shore storm wind blows while any insect is swarming, within a few days that insect will appear in unusual abundance in the drift-line on some lee shore.

(b) Emergence periods of particular insects. This is the most significant of all factors for the collector to bear in mind. What wind and waves gather depends on what nature has brought forth, ready to be gathered. Extraordinary accumulations of May-beetles and of Mayflies are well known to occur at regular times. It was an extraordinary shore deposit of black crickets that first interested me in the insects of the drift line (1900). Hancock has recorded (1894) for another species just the conditions of swarming and flight that made ready this crop of crickets that was gathered by the storm wind. Just after the publication of my paper (1900) recording the accumulation of the crickets in the drift on the shore of Lake Michigan on the 13th of August following a storm from the west, a friend wrote me that there had been an extraordinary swarming of the same species in the streets of the city of Rockford, Ill., (some 65 miles westward) on the 11th—the day the storm occurred. In my August collecting of 1916 I found but four specimens of this species.

Every one who has run a trap-lantern or who has sugared for moths knows how much atmospheric conditions have to do with bringing insects out in abundance. It is the night of high humidity just before a rainstorm that finds most of them astir. The col-

lector who would profit by the salvage of the shore-line would, therefore, do well to pay careful heed to season and to weather. After conditions favourable for swarming accompanied by off-shore winds, then let him search a low, sandy beach on a lee shore. It is doubtful whether there is any other place where specimens may be accumulated so easily and in such variety. Schwarz (1889) records that he and Hubbard in four days collected more than 1,100 species of beetles on the shore-line of Lake Superior at a time when the collecting there was not at its best. The Lepidoptera of the drift-line, to be sure, are worthless as specimens; most of the Coleoptera, however, are good enough for the cabinet, and insects of other orders are often in good condition.

WHAT THE DRIFT-LINE OFFERS.

Besides the vegetable debris brought down by woodland streams, the cinders and straw and other waste contributed by lake steamers, the dead vertebrates such as fishes and birds, a few of which are always present, and a few miscellaneous invertebrates—shells of mussels and snails or occasionally whole specimens of *Gammarus fasciatus*—there are always many insects present in the summer season. There are far more kinds of them than may profitably be listed here; but it may be worth while to mention in each of the orders, the forms most abundantly found in the drift-line, as indicated by my collections through the summer of 1906, during which season I collected merely a sample of the insects present whenever the collecting from the beach was good.

Coleoptera are by far the most abundant insects of the drift. My specimens, 2,248 in number, as determined for me by Mr. Herbert Morrison, represented 26 families and 127 species. The species that were represented by more than ten specimens, the date of principal occurrence, the number of specimens found on that date and the total number of each are as follows:

CURCULIONIDÆ:

Listronotus squamiger Say. VIII, 6:116-127.

Lixus terminalis Lec. VI, 19:10-12.

CARABIDÆ:

Elaphrus fuliginosus Say. VI, 13:31-31.

Pterostichus lucublandis Say. VI, 18: 102-179.

Platynus cupripennis Say. VI, 18:12-13.

Platynus placidus Say. VI, 18:9-15.

Galerita janus Fab. VI, 13:232-267.

Harpalus pennsylvanicus DeG. VIII, 12:117-121.

DYTISCIDÆ:

Hybius confusus Aube. Date? 8-14.

Agabus confusus Gryl. VI, 13:331-335.

GYRINIDÆ:*Gyrinus analis* Say. VI, 19:153-153.**COCCINELLIDÆ:***Megilla maculata* DeG. Date? 27-57.*Hippodamia 13-punctata* Linn. Date? 14-27.*Hippodamia parenthesis* Say. VI, 18:35-39.*Coccinella sanguinea* Linn. Date? 5-10.*Anatis 16-punctata* Oliv. Date? 44-67.*Chilocorus bivulnerus* Muls. Date? 59-66.**LUCANIDÆ:***Lucanus placidus* Say. VI, 12:16-23.**SCARABÆIDÆ:***Aphodius fimentarius* Linn. VII, 22:88-89.**CHRYSMELIDÆ:***Leptinotarsa decemlineata* Say. Date?:45-75.*Lina scripta* Fabr. Date?:17-26.*Diabrotica 12-punctata* Fabr. Date?:15-30.*Disonychia pennsylvanica* Ill. Date?:101-169.

It may be that owing to my special interest in aquatic beetles, I picked up a larger proportion of such genera as *Agabus*, *Ilybius*, and *Gyrinus* than of the others. I missed the annual swarming of the *Lachnosternas*.

Of Hemiptera, doubtless the most abundant were the aphids, which I did not collect at all, owing to their minuteness and bad state of preservation. Only the larger forms were taken. More than half of these were Pentatomidæ. The grotesque Membracids were represented by three species, *Smilia camelus* Fabr., *Xantholobus trilineatus* Say, and *Cyrtolobis vau*. The aquatic *Nepa* and *Ranatra* were represented by single specimens. My list, determined also by Mr. Morrison, shows nine families represented by 20 species and 53 specimens. Those represented by more than four specimens are:

SALDIDÆ:*Salda pallipes* Fabr. VII, 21:4-5.**GERRIDÆ:***Gerris marginatus* Say. VII, 13:9-9.*Limnoporus rufoscutellatus* Latr. VI, 13:5-6.**PENTATOMIDÆ:***Cænis delius* Say. VIII, 6:3-5.*Euschistus variolarius* P. B. VI, 13:4-7.*Apateticus cynicus* Say. VIII, 1:3-6.*Apateticus maculiventris* Say. VI, 13:10-11.

The Diptera of the drift, are represented mainly by innumerable cast skins of Chironomidæ from the lake bottom, and the many adult midges mixed with them are always in bad condition. Scattering crane flies are always present—species of *Tipula*, *Pachyrina* and *Dicranomyia*. Besides the flesh-flies of the drift that have been so well treated by Herms ('06) there are often numbers of Anthomyiidæ (*Chortophila*, *Cænusia*, etc.), Borboridæ (*Limosina*), etc., rarely in fit condition for specific determination.

Lepidoptera are represented during the course of the season

by nearly all the free-ranging butterflies, and by many strong-flying noctuids. *Utetheisa bella* was not uncommon in the drift-line on Aug. 23rd.

Hymenoptera and Lepidoptera I did not save for determination owing to their dilapidated condition. The former group is well represented by *Bombus*, *Apis* and several Ichneumonids and a few saw-flies.

The true Neuroptera are represented only by the delicate lace-wings. As determined for me by Mr. Roger C. Smith, these are.—

- Chrysopa oculata* Say. VI, 13:24-28.
 " *chlorophana* Burn. VI, 13:1-1.
Hemerobius stigmaterus Fitch. 2.
 " *conjunctus* Fitch. 4.
 " *hyalinatus* Fitch. 4.
 " *humuli* Linn. 2.
Micromus posticus Walb. 1.

Of Trichoptera, the pupal skins of three species, all undetermined, appeared abundantly in both flotsam and drift, the dates of maximum accumulations being Aug. 1st, 8th, 24th and 25th. The one common adult of the drift-line was *Agrypina curvata* Banks—not "*Glossosoma* sp.?" as reported in my first paper (1900) on Banks' determination. *Neuronia concatenata* Walk. once appeared, a single specimen, and also an undetermined *Leptocerus*.

Of Odonata, there are always present a few large dragon-flies, species of *Æschna* and *Anax*, and often there are smaller ones, *Sympetrum*, *Lestes*, and *Nehalennia*.

The Orthoptera of my drift collection, numbered but seven species. The three which numbered five or more specimens each (as determined by Mr. H. H. Knight) were:—

- Tettigidea lateralis* Say. VI, 13-148, of which but 34 were females.
Melanoplus femur-rubrum DeG. VIII, 23-24, of which one was a female.
Choriophaga viridifasciata DeG. VI, 13-5, all brown females.

The Ephemeridæ are represented abundantly in both flotsam and drift by innumerable cast nymphal skins, and by much fewer adult specimens. I have seen acres of the water surface along shore covered in scattered patches with floating felted masses of the skins of *Ephemera simulans*. On the 21st of July, 1906, there occurred a peculiar drift, that was composed almost entirely of the wings and other disintegrated fragments of adult Mayflies. It lay in grayish, curving lines, so thin it might have been easily overlooked, spread over the sand at the farthest reach of the gentle waves that

were then rushing in. Though inconspicuous, innumerable Mayflies were represented; about half of them, *Ephemera simulans* Walk. and the other half, three species of Heptagenia; *H. pulchella* Walsh, *H. interpunctata* Say, and an undetermined species. These were probably the remains of adults that had finished mating and egg deposition and had fallen, spent, upon the surface of the lake.

The insects one finds at the drift-line on any shore fall in three principal categories:

1. Those present by accident; having fallen into the lake and been swept up by the waves on to the beach. Here belong representatives of practically all orders of insects, among which the strong-flying and highly specialized members of the dominant orders do most abound. It is these that have chiefly been noticed hitherto. The lists that have been published by myself, by Miss Snow (1902) and by Dr. Schwarz show good general agreement.

2. Those that dwell in the lake, and that, on transformation, leave their exuviae floating on the surface. Here belong mainly three groups of aquatic herbivores: Mayflies, midges and caddisflies. It is chiefly the cast skins of these, less often the insects themselves, that one finds floating in the flotsam or cast upon the sand. More careful collecting and study of these would doubtless yield data of great value concerning the times and seasons and relative numbers of the insect population of our lakes.

3. Those that live as scavengers upon the carcasses of the drift-line. Here belong especially many beetles of the families Staphylinidae, Histeridae, Scarabaeidae and Carabidae together with a number of flies that have flesh-eating larvae.

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ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.

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Among the Coleoptera taken in the vicinity of Dunedin, Florida, during the past two years are several species which are evidently undescribed, and some others worthy of note on account of their rarity or known distribution. I therefore present the following notes and descriptions relative to them. It may be added that Dunedin is located on Clearwater Bay, three miles north of Clearwater, the county seat of Pinellas County, and 27 miles northwest of Tampa. The bay is formed by a number of keys or islands which parallel the coast of Pinellas Peninsula, about two miles from the mainland. One of these, Hog Island, about five miles long and one-half mile wide, has its southern end opposite the town of Dunedin. Its surface is of sand, somewhat thickly clothed with the characteristic sand-loving vegetation of the west coast keys. On the mainland east of the town, which is situated in a noted citrus-growing district, are numerous small lakes or ponds, some of which become almost extinct during the dry or winter season. Along the margins of these ponds and in and about the wet hammocks, which are densely grown up with deciduous trees and underbrush, most of the species noted have been taken. My collecting has been done between Oct. 20 and April 15, though a few species are included which were taken in summer and sent to me.

Scarites californicus Lec.—I regard this as a valid species. It can be separated at a glance from *subterraneus* Fab., of which it has been placed as a variety by Leng and other recent writers. It is strictly maritime, occurring only beneath seaweed or half-buried

logs, rarely on the beach of the bay, more frequently on that of the Gulf, where 12 specimens were taken in several hours' search on March 25, beneath thick masses of seaweed along Hog Island. Since *californicus* has never been recorded as mating or even associating with *subterraneus*, and since the latter is an inland form occurring usually in or about the margins of cultivated grounds, the two, in my opinion, are distinct and separate species.

Tetragonoderus fasciatus Hald.—Among a number of beetles taken by my son and his wife at electric light on the porch of my residence at Dunedin, in June and July, 1915, was a single one of this species. It is not included in Leng's "List of the Carabidæ of Florida,"* he merely stating that one had been taken in Mobile County, Alabama, by Loding. It is frequent in sandy places in Indiana, and Horn gives its range as Michigan and New York to Louisiana and Lower California.

Lebia pulchella Dej.—Single specimens of this handsome Carabid were taken beneath boards along the margins of ponds on Jan. 16 and April 4. Schwarz has taken it at Ft. Capron and Tampa, but it is rare wherever found.

Agonoderus indistinctus Dej.—Single specimens were taken at Dunedin, March 28 and Sanford, March 24. Not included in Leng's list.

Haliplus punctatus Aube.—A single example of what I take to be this species, judging from the translation given by Roberts† of Aube's original description, was taken Jan. 30 from a pond in an old clay pit. It is not any one of the species described by Matheson,** and so was sent to that gentleman for examination. He pronounced it a new species, but as he and Roberts disagreed as to what the *H. punctatus* of Aube really is, I place it under that name provisionally.

Peltodytes oppositus Roberts.—Several specimens were taken from ponds and ditches between Feb. 10 and April 2. This and the preceding are the only two species of the family so far taken in the vicinity of Dunedin.

Notomicrus nanulus Lec.—This minute Dytiscid was taken

*Bull. Am. Mus. Nat. Hist., XXXIV, 1915, pp. 555-601.

†Journ. N.Y. Ent. Soc., XXI, 1913, 95.

**Loc. cit., XX, 1912, 156-193.

from a pond east of Dunedin on Jan. 19 and Feb. 9, 1913, eight specimens having been secured. It has not since been found though especial search has been made for it. It occurs on the underside of wholly immersed boards, and is only detected when it moves. LeConte described it from Louisiana in 1863, from specimens taken by Dr. Schaum, and it has not before been recorded from Florida.

Philhydrus estriatus, sp. nov.—Broadly oblong-oval, feebly convex. Above black, shining, the side margins of thorax and elytra reddish-piceous; under surface dark piceous, the antennæ, palpi and tarsi paler. Thorax and elytra very finely, rather closely and evenly punctate, the elytra without trace of sutural striæ, each with two irregular rows of large punctures located along the lines of the fifth and seventh striæ, were the latter present. Under surface finely and very densely punctate. Mesosternal crest low with front edge strongly oblique. Length 6.5 mm.

Described from three specimens taken from ponds on Jan. 21 and March 23. Intermediate in size between *consors* and *perplexus* of LeConte, being smaller and much less convex than *consors* and larger and more broadly ovate than *perplexus*. In both those species the punctuation is much coarser, the sutural striæ very distinct and the coarser punctures of elytra in four rows. From *P. cinctus* Say, which it resembles in colour, *estriatus* is separated by its less convex form, absence of sutural striæ and oblique front edge of mesosternal crest.

Helocharis maculicollis Muls.—A female of this species, taken Feb. 25, had a large mass of eggs attached to the under side of the abdomen. They were very regularly placed in a double layer, the median portion of 12 eggs consisting of two rows, each made up of three eggs placed end to end. On each side of this longitudinal median axis and arranged at right angles to it were two rows, each composed of nine eggs placed side by side. There were thus 36 eggs in the double layer each side of the median support, or 84 in the whole mass. I can find no previous record of the egg-bearing habit of this species.

Arthmius gracilior Casey.—Taken in some numbers by sifting vegetable mould in a low, wet thicket. Originally described from Tampa, it was placed as a synonym of *Batrisus globicollis*

Lec. by Henshaw, but Fall, in a recent letter, states that the sexual characters are different and that it is probably distinct.

Exochomus marginipennis childreni Muls.—This variety is common on oak throughout the winter, and mention is made of it here only to record the taking of two specimens having the elytra wholly pale, the usual subapical black spots being absent.

Hyperaspidius militaris Lec.—Schwarz records this species as "rare on oak shrubs." About Dunedin it is swept in numbers in late autumn and early spring from a species of *Helenium* and other low Compositæ, and has never been taken from oak.

Scymnus oculatus, sp. nov.—Oval, convex. Head, thorax, legs and last ventral wholly pale yellow; under surface reddish yellow, finely and densely punctate; elytra black with a large oval, common reddish spot on median third. Upper surface rather thickly clothed with very fine semi-prostrate whitish hairs. Thorax almost smooth; elytra coarsely not closely punctate. Length 1 mm.

Described from a single specimen beaten from *Myrica cerifera* L. on March 24. A small and uniquely coloured species belonging to Horn's Group B, i. e., having the metacoxal line running parallel to the first ventral suture. Neither Horn nor Casey describe a form having a single common elytral pale spot, hence I have little hesitation in adding a new member to this already over-crowded genus.

Tritoma dissimilis, sp. nov.—Elongate-oval, feebly convex. Black, legs, antennæ and palpi reddish brown. Head and thorax sometimes piceous, minutely alutaceous, finely and sparsely punctate; sides of thorax straight from base to apex. Elytra slightly wider at base than thorax, widest and most convex at basal third, thence tapering to the rounded apex; striæ with feebly impressed rows of small, close-set punctures; intervals very minutely and sparsely punctate. Under surface finely and sparsely punctate. Length 4-4.5 mm.

Taken from beneath bark of dead oak; March 23, 24. Close to *T. angulata* Say but larger, with distinctly longer and more tapering elytra and straighter sides of thorax.

Tomarus hirtellus Schwarz. Frequent beneath piles of chips and old leaves. Not listed by Henshaw though it was described in 1878.

Dermestes elongatus Lec. A single specimen was taken from beneath the carcass of a gopher turtle on March 8. LeConte described it from Georgia as rare, and Schwarz records one specimen from Haulover, Florida.

Monædus guttatus Lec. Taken in numbers Feb. 23—29, and again December 13, by beating masses of a very slender milkweed, *Metastelma scoparium* Nutt., near the border of a wet hammock. Horn in 1882* characterized the genus *Monædus*, placing it in the family Lathridiæ, and described *M. guttatus* (crediting the species in a footnote to Dr. LeConte) from "a single specimen taken by H. G. Hubbard at Cedar Keys, Fla."**

In 1894 Sharp erected the family *Adimeridæ* for a supposed new genus, *Adimerus*, of which he described three species from Central America.† Arrow in 1909 states‡ that *Adimerus* Sharp (1894) is a synonym of *Monædus* Horn (1882), and corrects Horn's mistake regarding the number of tarsal joints. He retained the family name *Adimeridæ* and listed five species of *Monædus*. In 1913 Champion‡‡ accepted Arrow's conclusions regarding the synonymy of *Adimerus* and placed *M. dubius* Sharp as a synonym of *M. guttatus*, but still retained the family name proposed by Sharp.

In conformity with Article 5 of the International Rules of Zoological Nomenclature the family name *Adimeridæ* Sharp should be abandoned, being based on a generic name which was a synonym, and should be replaced by *Monædidæ*, with *Monædus* Horn as the typical genus.¹ The genus is represented in Guadeloupe and Central America by several species which are said to occur under bark. *M. guttatus* is represented in the U. S. National Museum collection by three specimens from Florida, all taken by Hubbard and Schwarz at Biscayne on May 10; also by specimens from Tampico, Panama, Cuba, Guatemala and Monteserrat.²

*Trans. Amer. Ent. Soc., X, 116, Pl. IV, fig. 10.

**Mr. H. S. Barber, in a recent letter, states that Mr. Schwarz "averts that *guttatus* was not taken by either Hubbard or himself at Cedar Keys, but that the type specimen came from Jupiter, Fla."

†Biol. Cent. Amer., Col., vol. II, pt. 1, 441, Pl. XIV, figs. 3, 3a and 4.

‡Ann. Mag. Nat. Hist., IV, 195.

‡‡Trans. Ent. Soc. London, 73.

¹ Since this was in type Mr. Barber has called my attention to the fact that Leng and Mutchler (Bull. Am. Mus. Nat. Hist., vol. 33, p. 415) have used the family name *Monædidæ* for four species of *Monædus* from Guadeloupe.

² Auct. H. S. Barber, to whom I am also indebted for several of the citations above given.

Tenebroides foveatus, sp. nov. Elongate-oblong, subdepressed. Black, feebly shining, antennæ, palpi and tarsi piceous. Head finely and rather sparsely punctate, vertex with a large, rounded median fovea. Thorax subquadrate, slightly wider than long, sides almost straight, feebly diverging from base to apex; disc sparsely and finely punctured, hind angles almost rectangular. Elytra at base not wider than apex of thorax, sides parallel to apical third, thence broadly rounded to apex; striæ with rows of unimpressed, medium sized, close-set, round punctures; intervals flat, smooth. Under surface finely and sparsely punctate. Length 10 mm.

One specimen taken at light on porch of house, July 5. Its large size, foveate head and flat, smooth intervals distinguish it from our other described forms.

Lacon curtus Lec. Taken in small numbers on several occasions from beneath logs half buried in dry sand. From three to a dozen are usually found together. Originally described from Georgia, it is not given in Schwarz's "Coleoptera of Florida," though he lists *L. rectangularis* Say as common. I have not seen the latter species in Florida, and Dr. Schwarz may have been mistaken in his identification.

Elater discoideus Fab. A single specimen of this handsome Elaterid was beaten from the bayberry, *Myrica cerifera* L. on Feb. 23. Its range is given as Canada to Georgia, and no previous Florida record can be found.

Cebrio mandibularis Lec. Two specimens of this interesting species were taken at light on June 15, as was also one of *C. bicolor* Fab. The latter species is the only one listed by Schwarz, though LeConte's species was described from Florida in 1865.

Pyractomena lucifera angustata Lec. In 1851 LeConte described* *Pyractomena angustata* from the "Southern States," and stated that: "The thorax is usually longer than wide; in one specimen (probably distorted) the reverse is the case." His species was afterward, by himself and Henshaw, placed as a synonym of *P. lucifera* Melsh. Among the specimens of Lampyrids taken at Dunedin and Eustis, Fla., are three males having the thorax distinctly longer than wide and its sides perfectly straight and parallel

*Proc. Acad. Nat. Sci. Phil., 1851, 336.

from the base to beyond the middle, then strongly oblique to the obtusely angulate apex. In all specimens of *lucifera* at hand, from Indiana and Florida, the thorax is fully or quite as wide as long, with sides more or less curved or oblique from base to apex. The elytra of the Dunedin and Eustis specimens are more distinctly granulate-punctate, and the seventh ventral segments are narrower than in the true *lucifera*. With the belief that these specimens represent at least a distinct variety and that they are probably the same as LeConte's *angustata*, I have restored his name as above given.

Telephorus albolineatus, sp. nov. There has long been confused with the *Telephorus rectus* of Melsheimer, a form which I here separate and name as above. The body is distinctly narrower and has the thorax narrower with sides more curved and apex more rounded than in *rectus*. The black median stripe of the thorax is narrower, with its sides less irregular than there. The elytra are more coarsely, rugosely punctate, are clothed with coarser pubescence and have the suture and side margins narrowly but wholly pale. Legs black, the femora sometimes with basal third yellowish. Length 5-5.5 mm.

Common at Dunedin in March and April, where it occurs on oak, bay and other foliage in wet hammocks. Sanford, March 27. A very closely related, if not the same species, occurs in the tamarack marshes of northern Indiana. LeConte had this species before him when he wrote his second paper on Lampyridæ,* and placed it as "variety" B of *rectus*. I have not as yet taken the true *rectus* in Florida.

Disonycha abbreviata leptolineata, var. nov. During the winter months there occurs in small numbers beneath boards and chunks along the borders of lakes and ponds near Dunedin a form of *Disonycha*, which is evidently an undescribed variety of *D. abbreviata* Muls., if not a distinct species. It differs from northern specimens of *abbreviata* in having the body a brighter red, the antennæ deep black, not piceous, and especially in having the black lines of elytra very narrow, not over one-half the width of those of *abbreviata* and more finely punctate than there. In size, form and structure there appears no difference, hence it may for the present be regarded as a southern colour variety of that species, though Horn in his "Halticini" says of *abbreviata*: "This is one of the least variable of our vittate species."

*Trans. Amer. Ent. Soc. IX, 1881, 52.

SOME EUGLOSSINE BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The Euglossines are perhaps the most brilliant of all bees, and appropriately, many of them seem to visit the magnificent orchids of the South American forests. I have recently had occasion to study some previously unnamed Euglossines in the U. S. National Museum, and the results are presented herewith:

Eufriesia purpurata (Mocsary).

I have a male from F. Smith's collection, labelled *Euglossa brullei* Lep., but it does not at all agree with the description of that species, and is a *Eufriesia*, related to *E. pulchra* (Sm.). The locality is S. Paulo, Brazil. It agrees well with *E. purpurata* (Mocs.), and is referred to that species. Mr. Meade-Waldo, to whom I wrote concerning the matter, replied that in the British Museum they had four specimens under *E. brullei*, "all with dark heads and thorax, and abdomens varying from reddish-bronze to almost clear green." He also objected to the reference to *E. purpurata*, since Mocsary's figure (which I have not seen) represented it as having the "head, thorax and abdomen totally reddish-bronze." The description, however, as quoted by Friese, agrees with my specimen. It is stated that the abdomen (excepting the first segment) is "viridi- vel igneo-auratis," as in the British Museum so-called *brullei*. In my specimen it shines copper-red and golden-green in different lights.

Euglossa subg. **Glossura**, n. subg.

Mouth-parts extremely elongated, extending far beyond apex of abdomen; scutellum bigibbous. Type *Euglossa piliventris* guerin. Also includes *E. ignita* Smith.

Euglossa piliventris Guérin.

Bartica, British Guiana, May 17. (U. S. N. M.) I have one from Maroni.

Euglossa bicolor Ducke.

Near Para, Brazil (Miss H. B. Merrill, U. S. N. M.). The sides of the thorax and the last three abdominal segments are green.

Euglossa mandibularis Friese, var. **bernardina**, n. var.

Male. Face and front golden-green, vertex blue-green; mandibles with a minute, cream-coloured spot at base, and a larger one on malar space; thorax and abdomen above shining greenish

blue. As Friese notes, this has very nearly the general form of *E. piliventris*, with bigibbous scutellum. The mesothorax is shining, with minute punctures, not very dense on disc. The mouth-parts do not reach to the end of the abdomen. There is a minute, black fleck in middle of scutellum. The labrum is broader than long, the reverse being the case in *E. piliventris*; and the cream-coloured band at lower sides of face extends broadly from orbits to labrum, whereas in *piliventris* it forms an L-shaped mark.

Hab.—San Bernardino, Paraguay, Oct. 4. (K. Fiebrig; U. S. N. M.) This is very distinct from all species I have seen, but the specimen appears to represent a colour-variety or race of *E. mandibularis*. Friese's description of *mandibularis* omits some of the salient characters of our insect, so it is possibly a different species, to be called *Euglossa bernardina*.

***Euglossa variabilis* Friese.**

Friese separated *E. variabilis* as a species very closely related to the common *E. cordata* L., but distinguished by the more shining, less densely punctured thoracic dorsum. He considered it to be very variable, and named three varieties. Ducke, on reviewing the subject, referred most of Friese's *variabilis* back to *cordata*, but separated one of the varieties as a species, *E. azurea* Ducke. Since this appears to be Friese's *E. variabilis* var. *cyanea*, it is presumably to be called *E. cyanea* (Friese). So far as I am able to judge, *E. variabilis* (excluding *cyanea*) is sufficiently distinct for recognition, and it even seems probable that the varieties deserve specific rank. There is certainly much individual variation in colour, but series collected at the same time and place present a recognizable facies.

***Euglossa variabilis*, var. *mixta* Fries**

Females, collected by Aug. Busck in the region of the Panama Canal, are labelled Tabernilla, July 21, and Cabima, May 21. Another comes from Las Cascadas, collected by A. H. Jennings. The abdomen is variably but always evidently suffused with copper-red or carmine. The insects are a little larger and more robust than the next variety.

***Euglossa variabilis*, var. *purpurea* Friese.**

Friese says the entire body is purple-red. The insects before me are green, suffused with copper-red, but it seems probable that

Friese's type was merely an extreme example of the same race. The specimens seen are from Costa Rica, with the following data: male, Sixola River (Wm. Schaus); female, Pozo Azul, June 5 (M. A. Carriker).

***Euglossa variabilis*, var. *hemichlora* n. var.**

Female. Like the Costa Rica form just mentioned, but abdomen almost pure green, contrasting with the coppery thorax. The small size (as compared with *mixta*) agrees.

Hab.—Paramba, Ecuador, April, from W. F. H. Rosenberg. (U.S.N.M.) If we regard *mixta* and *purpurea* as species, *hemichlora* is a colour-variety of *purpurea*; but if it turns out that Friese's extreme *purpurea* form is specifically distinct from the Costa Rica insect, then *E. hemichlora* will be the name for the series represented by the Costa Rica and Ecuador specimens before me.

***Euglossa cyanura*, n. sp.**

Female.—Length about 10 mm.; like a small *E. variabilis*, but head and thorax brilliant emerald green, abdomen splendid purple-blue, green at base and apex; black tuft or fleck on scutellum very large, extending from apex three-quarters of distance to base; ocelli much closer together than in *variabilis*, the posterior ones separated by a distance only equal to the diameter of one; labrum very short, the dark spots nearly circular; punctures of mesothorax sparser than in the Costa Rica *purpurea*.

Hab.—Porto Bello, Panama, Feb. 24, 1911. (Aug. Busck; U. S. N. M.)

***Euglossa charapensis*, n. sp.**

Female.—Length about 12 mm.; like *E. cordata*, but distinctly larger and more robust; wings very brown; scutellum more densely punctured, shorter in proportion to its width, less filled out at sides posteriorly, and with the black tuft large and broad, extending as in *E. cyanura*; apical part of abdomen with very strong copper-red tints. The face is distinctly broader than in *cordata*.

Hab.—Rio Charape, Peru, Sept. 17, 1911, (C. H. F. Townsend). This may possibly be Friese's *E. cordata* var. *aureiventris*, but Friese gives no particulars except that the abdomen is shining golden-red, so his insect presumably has the structure of true *E. cordata*. *E. cordata* extends right across South America; I have it from Bahia on the east, and Ecuador on the west.

ON THE SYNONYMY OF *DELPHAX MAIDIS* ASHM.

Through the kindness of Dr. L. O. Howard and the courtesy of the National Museum, Washington, D.C., I have been able to examine a male cotype of *Delphax maidis* Ashm., and can now state definitely that it is synonymous with *Pundaluoya simplicia* Distant. Unfortunately I have not been able to examine a male specimen from India, but Mr. Distant has stated that the Hawaiian and Indian specimens are the same species. I have not seen the type of *Delphax psylloides* Leth., but from the description and figures I conclude that it is the same as *D. maidis* Ashm. It is true that the figure shows no spur on the hind tibia, but this should not over-ride the other characters or the fact that Lethierry placed it in Delphacidae. Green's description of the habits confirm me in this conclusion.

I have now examined specimens of this species from North America, Hawaii, Fiji, Australia, Amboriva, Java, Philippines, Formosa, Malay Peninsula and British India. It is also recorded from Ceylon, Seychelle Islands, West Africa, Cuba, Nicaragua and Brazil. Which of these places is the natural habitat I am unable to say, for in the Malay Archipelago and the Philippines it lives on native grasses as well as *Zea mays*.

I have not seen specimens of *Pundaluoya ernesti* (Kirk.), but from the figure and description I am unable to place it in the same genus with *D. maidis* Ashm. I recognize Kirkaldy's genus *Peregrinus* as distinct from *Liburnia*, and therefore consider the following as the correct synonymy:

***Peregrinus maidis* (Ashm.) Kirk.**

Delphax maidis Ashmead, 1890. Psyche, p. 323.

Delphax psylloides Lethierry, 1894. Indian Museum Notes, p. 105.

Dicranotropis maidis Van Duzee, 1897. Bull. Buffalo. Soc. Nat. Sci., p. 240; Van Dine, 1911, U.S. Dep. Agr., Bur. Ent. Bull. 93, p. 34.

Peregrinus maidis Kirkaldy, 1904. Entom., p. 175; 1906, Haw. Sugar Planters' Assn. Ent. Bull. I, p. 407; 1907, op. c. III, p. 132; Van Duzee, 1907, Bull. Buffalo Soc. Nat. Sci., p. 43.

Pundaluoya simplicia Distant, 1906. Faun. Brit. Ind. Rhyn., III, p. 468; 1916, op. c. VI, p. 134.

Honolulu, Dec. 1, 1916.

F. MUIR.

A NEW MARITIME ANTHOMYID (DIPTERA).

BY CHARLES W. JOHNSON, BOSTON, MASS.

Phyllogaster robustus, sp. n.

♂. Face silvery white, front brownish and occiput grayish pollinose, antennæ, aristæ, palpi and proboscis black, arista pubescent, thickened near the base. Thorax grayish with three conspicuous brownish lines when viewed from behind, all the bristles prominent, dorso-centrals three, scutellum with two large apical and one lateral bristle. Abdomen grayish, an interrupted blackish median line and large blackish spots on the sides of the second and third segments near the posterior margins, hypopygium prominent, the subanal, phylloid; appendages which extend posteriorly from beneath the third ventral segment are broad and slightly contracted near the middle. Legs black, only the extreme tips of the femora and bases of the tibiæ yellowish, halteres yellow. Wings grayish hyaline, veins dark brown, squamæ white. Length 7 mm.

♀. Similar to ♂, front slightly wider, about one and one-half times as wide as each eye. The blackish abdominal markings are as conspicuous as in the male, the end of the ovipositor is grayish and armed with two hook-like spines. Length 8 mm.

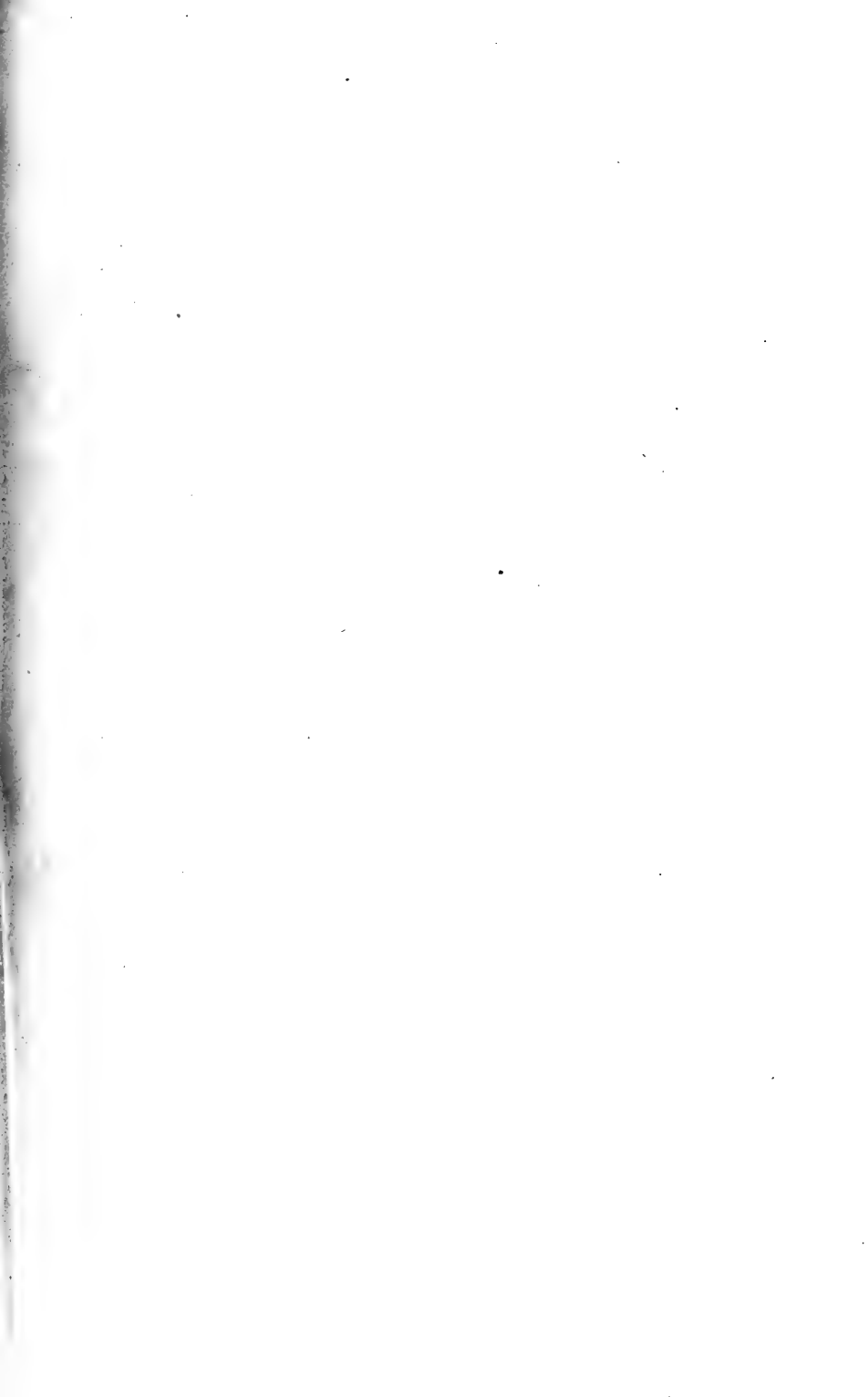
Holotype and allotype, Edgartown, Mass., June 29, 1910; two paratypes, Chatham, Mass., June 30 and July 1, 1904; and two paratypes, Buttonwoods, R.I., June 17, 1912, in the collection of the Boston Society of Natural History. Paratypes from the above localities are also in the Museum of Comparative Zoology, American Museum of Natural History, Academy of Natural Sciences, U. S. National Museum, and the collections of Dr. J. M. Aldrich and the author.

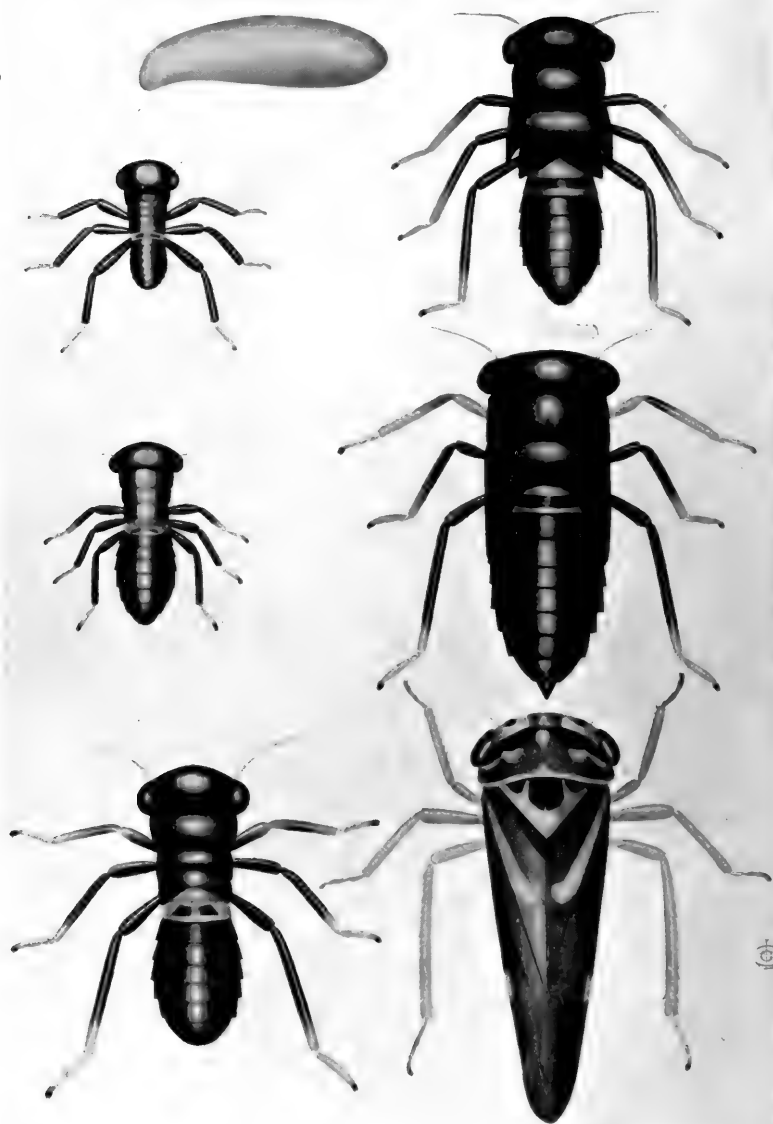
This is one of the most conspicuous of the group of Anthomyids that frequents the grayish sandy beaches of our coast. Its larger and more robust appearance, darker legs and more prominent abdominal markings, readily distinguish it from *Phyllogaster cordyluroides* Stein.

Dialyta flavitibia Johannsen.

This species, which has quite recently been described by Dr. O. A. Johannsen, from the Adirondack Mts., N. Y. (Trans. Amer. Ent. Soc., XLII, 394, 1916), is quite widely distributed. I have collected it at Machias, Me., July 21; Brookline, July 7; Plymouth, July 28, and Cheshire, Mass. Also at Danbury, Conn., June 15, and Ricketts, North Mt., Pa., Sept. 1. I have received it from Winchendon, Mass., July 1 (A. P. Morse); Colebrook, Conn., July 20 (W.E. Britton), and Kearney, Ont., July 7, 1909 (M. C. Van Duzee).

Mailed April 7th, 1917.





IDIOCERUS FITCHI VAN D., EGG, NYMPHS AND
ADULTS. (P. 153.)

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POPULAR AND PRACTICAL ENTOMOLOGY

NOTES ON THE BLACK APPLE LEAF-HOPPER.

(*Idiocerus fitchi* Van D.)

W. H. BRITTAİN AND L. G. SAUNDERS,* TRURO, N.S.

Originally described by Fitch from New York State, this insect apparently occurs quite generally throughout the North-eastern United States and Canada. It is very common throughout the Annapolis Valley of Nova Scotia.

INJURIES.

Many farmers who have noticed this insect at work, have considered it to be a pest of some importance. Most of the injuries that they have attributed to its agency, however, have been brought about by other causes. Where numerous, the insects swarm over the new growth and particularly about the blossom clusters, where they may easily be observed feeding. Though unquestionably some damage results from their work, it is apparent, from a careful study of their feeding habits, that they are of little importance as fruit pests. Numbers of the nymphs were placed on apple seedlings, and their effect on the plants noted. There was no noticeable curling or blotching of the leaves as a result of even a relatively large number of nymphs on a small seedling. The only effect that could be seen, was that occasionally a bead of clear sap would be seen oozing through a punctured blossom pedicel or leaf petiole. This might eventually result in the withering and dropping off of the affected part. It was evident, therefore, that the damage done was not serious, and that the presence of the pest in the orchard, even in large numbers, did not justify the alarm sometimes caused by its appearance.

DESCRIPTION OF LIFE STAGES.

Egg.—Length .065 to 0.737 mm. Width 0.167 to 0.187 mm. Elongate, more or less cylindrical; widest near posterior extremity,

* Contributions from Entomological Division, Nova Scotia, Department of Agriculture.

which is rather broadly rounded; rather strongly curved near apex on one side; apex sharply curved on this side, broadly rounded on the opposite side; colour whitish; chorion smooth and shining.

Stage I.—Length 1.24 to 1.82 mm.; width of head including eyes .52 to .56 mm. General colour shining black. Eyes dark red. Head short and wide, broadly rounded before eyes. Thorax with fine yellowish median longitudinal line. First abdominal segment yellowish, with broad, dark brown band slightly procurved, not reaching lateral, posterior or anterior margins. Second segment sometimes yellowish, on posterior margin. Abdomen with numerous long, stout hairs regularly placed. Legs shining brownish black; coxæ, trochanters and tarsi pale yellowish, excepting tip of claws which are brownish black. Antennæ pale yellowish, basal segment darker, almost brown. Short, stout hairs on the entire length of tibiæ, and a very few on the femora.

Stage II.—Length 1.48 to 1.75 mm.; width of head including eyes .55 to .6 mm. Head and legs relatively smaller than in preceding instar. Distal third of fore tibiæ yellowish. Tips of tarsi and claws brownish black. Colouring in other respects similar to stage I. Tibiæ very finely pubescent, with a few longer hairs at tip; not clothed for the entire length as in former instar. Entire surface of body and legs very finely granular, producing a less shining appearance.

Stage III.—Length 2.025 to 2.62 mm.; width of head including eyes 1.05 to 1.112 mm. Colouring similar to first two instars, excepting a continued modification of colouring on legs, the fore tibiæ being brownish black on proximal half and yellowish on the remainder, while the distal extremity of the middle tibiæ is yellowish. Wing-pads apparent.

Stage IV.—Length 3.1 to 3.29 mm.; width of head including eyes 1.25 mm. Form and colouring similar to other stages; wing-pads prolonged, mesothoracic pair extending along sides of metathorax for two-thirds their length.

Stage V.—Length 3.65 to 3.82 mm.; width of head including eyes 1.47 to 1.55 mm. Body stouter than preceding stages, lateral margins being almost parallel, slightly the widest at eyes; prothorax a little narrower than head and longer; mesothorax shorter than prothorax and metathorax still shorter. Wing-pads

reaching just beyond articulation of 4th and 5th abdominal segments. Abdomen tapering gradually to 7th segment, thence more sharply to caudal extremity. Abdomen with usual arrangement of short, stout hairs, regularly placed. Last abdominal segment pale dusky yellow. Fore legs pale yellow, very slightly dusky on proximal end of tibiae and claws, others as in preceding instar.

Adult.—The following is the description given by Fitch (1) for this species:

Chestnut-brown varied with white; elytra hyaline, with a large, fuscous spot on the middle and another at the apex of the outer margin, with an intervening white spot; a faint, white spot towards the base of the sutural margin. Length 0.35 mm.

The more complete description of Osborne and Ball (6) is as follows:

Chestnut-brown with narrow, light stripes on pronotum, scutellum, and clavus. Length of female 5.75 mm.; male 5.25; width 1.7 mm.

Face, in the female, chestnut with broad circles around the large, black spots on vertex, and small crescents under the ocelli light yellow; in the male, yellow with a chestnut stripe down the middle and a darker one each side from the corner of the eye down the genæ outside the loræ. Pronotum chestnut with a pair of black spots on the anterior margin, the posterior margin and three spots on the disc light yellow, scutellum with the margins and tip light yellow. Elytra brownish, the nervures darker, a narrow, light stripe on the outer margin of clavus, and a hyaline band crossing the apex and broadening towards the costa where it sharply interrupts the broad, dark margin.

Head scarcely wider than the short, convex pronotum, but very deep. The outer anteapical cell short, triangular, the nervure then curving away to the costa. Ultimate ventral segment of the female with the posterior margin rounding, slightly emarginate in the middle; male valve with the posterior margin acutely triangular, the sides concave.

FOOD PLANTS.

Fitch (1) records this species as having been taken on thorn bushes, and Osborne (7) reports it from the hawthorn and crab.

In Nova Scotia it is most common on pears and apples, swarming over the trees in large numbers during the spring and early summer.

LIFE-HISTORY.

The emergence of the nymphs from the eggs commences several days before the apple blossom petals open, and continues for some time after they fall, a period, speaking generally, including the latter part of May and the first part of June. The duration of the nymphal stage is from 7 to 8 weeks.

Some days after emergence copulation takes place, and shortly after this, the eggs are laid. Selecting a suitable place, most frequently in the fruit spur, or a roughened surface on one of the smaller twigs, the female makes a puncture with her beak. She then draws herself forward and inserts her ovipositor in the spot, remaining thus for several minutes. She then removes her ovipositor, rests for several minutes, and selecting another suitable location, repeats the process.

There is only one brood a year, the winter being spent in the egg stage.

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EXPLANATION OF PLATE IX.

Idiocerus fitchi.—Fig. 1, egg; figs. 2, 3, 4, 5, 6, first, second, third, fourth and fifth stage nymph; fig. 7, adult.

THE INSECT COLLECTIONS OF CANADA: I.

THE COLLECTIONS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

BY C. J. S. BETHUNE, GUELPH.

When the Entomological Society of Ontario was organized in April, 1863, one of the objects set forth in its constitution was the formation of a general collection of insects. During the following year the records show that a cabinet of seven drawers was presented by Professor Croft, the President, and nearly 1,700 specimens were contributed by seven members. At another meeting held during the same year over 600 specimens, belonging to various orders were added to the collection. An excellent beginning was thus made through the generosity and enthusiasm of the members.

In December, 1869, the Society received a grant of \$400 for the year 1870, from the Board of Agriculture and Arts Association of Ontario, on condition that it "furnished an Annual Report, formed a cabinet of insects useful and prejudicial to agriculture and horticulture, and continued the publication of the *Canadian Entomologist*." In fulfilment of these conditions the first of the Society's Annual Reports was published and a cabinet of insects, arranged from an economic point of view, was prepared and placed in the rooms of the Association in Toronto. What became of this collection the writer has been unable to ascertain.

Being now possessed of an annual income, the Society made a grant of \$75 to the London Branch towards the purchase of a cabinet. With this aid the Branch procured a large, black walnut cabinet containing forty-five drawers and proceeded gradually to fill it with an excellent collection. It now forms part of the Society's property and occupies a place with the rest of our material in the Museum of the Ontario Agricultural College. A cabinet

of fifteen drawers, filled with specimens, was bequeathed to the Society by its first Curator, the late Rev. James Hubbert.

In 1875 the attention of the Society was drawn to the desirability of sending a collection of Canadian insects to the Centennial Exhibition to be held at Philadelphia during the following year, and measures were taken to carry the project into effect. Aided by a grant of \$500 from the Commissioners appointed by the Dominion Government, the work was entered upon with great activity by the members resident in London. A specimen case of the kind used at the Museum of Comparative Zoology at Cambridge, Mass., was procured from Dr. Hagen, and a large number of similar style were constructed. A supply of sheet cork, of double the ordinary thickness, for lining the cases was obtained from England. All the members in London who had collections generously placed them at the disposal of the Committee who had charge of the work, and many others, resident in different parts of Ontario and Quebec, liberally assisted in supplying specimens to fill any requirements for the completion of the exhibit.

The work went on during many months, and in the spring of 1876 the collection was completed and sent to Philadelphia, where it arrived without injury to a single specimen. It consisted of eighty-six cases, forty-five of which were filled with Lepidoptera, twenty-seven with Coleoptera, three with Hymenoptera, five with Neuroptera (including the Odonata and some other orders), two with Hemiptera, three with Diptera and one, with Orthoptera. When spread out in the Agricultural Hall they formed a double row more than seventy-five feet long and presented a very attractive appearance.

In order to ensure correctness in naming, all doubtful specimens were submitted to specialists as far as possible. Mr. A. R. Grote, the leading authority on the Lepidoptera, twice visited London, and on each occasion spent some days in carefully going over the collection. The Coleoptera were largely named by Dr. G. H. Horn, the Geometers were submitted to Dr. A. S. Packard, and the Neuroptera were identified by Dr. Hagen. The value of the collections for purposes of reference was thus immensely increased. Years afterwards the Noctuids were inspected by Dr. John B. Smith, and he could find but few instances of mis-identi-

fication. The chief credit for the successful accomplishment of this great task is due to the energy and enthusiasm of Dr. William Saunders and Mr. E. Baynes Reed, two of the original members of the Society.

In 1882 a portion of the collection, consisting of forty cases, was sent to the International Fisheries Exhibition in London, England, by request of the Dominion Minister of Marine and Fisheries. It was also sent to the Dominion Exhibition in Ottawa.

In 1886, in compliance with the request of the Dominion Government, and with the cordial approval of the Provincial Government, the whole of the Society's collection of Canadian insects was sent to England to form part of the Indian and Colonial Exhibition. The collection contained over ten thousand specimens, representing the various orders. Two of the cases were broken in transit, and a number of specimens of Lepidoptera were damaged. After the return of the collection to London, Ontario, it was decided that it should not again be sent away for exhibition purposes, in order that any danger of injury or loss might be avoided. From these exhibitions the Society received a number of medals, gold, silver and bronze, and several diplomas.

In 1890 the Society purchased the collections of Mr. Johnston Pettit, of Grimsby. These consisted of a cabinet of twenty small drawers, containing a fairly representative collection of North American Coleoptera determined for the most part by Dr. Horn and other specialists, and, therefore, valuable for reference; there was also a variety of specimens of exotic Lepidoptera and other orders.

The most interesting and probably the most valuable of the Society's possessions from a scientific point of view is the D'Urban collection of Lepidoptera. It consists of a single drawer (No. 16 in the large, walnut cabinet), containing 183 specimens of moths, mostly Noctuids and Geometers. In one corner is pinned the following note by Mr. E. Baynes Reed, dated London, November, 1871: "This collection of Canadian Moths was made by Mr. William D'Urban, formerly a resident of Montreal, but now of Exeter, Devon, England. They were taken to England by him and sent to Mr. Francis Walker at the British Museum for identification. Many of the specimens are the identical types of Mr.

Walker's catalogue. The labels are all in his handwriting. Mr. D'Urban sent the collection to Mr. E. B. Reed who reset them, taking care to preserve the identification. The collection has thus twice crossed the Atlantic."

The re-setting was probably a change from the English custom of pinning low to the use of long pins and to a much higher position.

Dr. J. McDunnough, of Decatur, Ill., has recently inspected the collection and has published a series of notes on a number of the specimens in vol. III, No. 1, of the Barnes & McDunnough, "Contributions to the Natural History of the Lepidoptera of North America."

Mr. D'Urban published "A systematic list of Lepidoptera collected in the vicinity of Montreal" in *The Canadian Naturalist and Geologist*, vol. V, pp. 241-266, and in vol. VI, pp. 36-42 under the title "Addenda to the Natural History of the River Rouge" (Montreal, 1860-1861) descriptions of new species of Nocturnal Lepidoptera, by Mr. Francis Walker of the British Museum, the types of most of which are in this "D'Urban Collection."

The remaining forty-four drawers of this cabinet contain a variety of very beautiful and interesting specimens from various parts of the world. Fifteen drawers are filled with gorgeous butterflies and moths from India, China, Japan, Africa, South America and the West Indies; six with beetles of wonderful shapes and colours from India, Australia, Africa and South America; two with East Indian Hymenoptera, Hemiptera and Orthoptera; one with tropical Arthropods (scorpions, centipedes, etc.) There are also four drawers of English Lepidoptera and one of Diptera sent by Mr. F. Walker of the British Museum. The remainder are filled with North American specimens from the Southern and Western States, Manitoba (collected by the late Mr. E. F. Heath), some remarkable hybrids of Saturnian moths, silk and cocoons, Insect Architecture, etc.

The most important collections belonging to the Society are contained in one hundred drawers arranged in five double cabinets. Twelve drawers are filled with Butterflies, six with Sphinges, twelve with Bombycid moths, nineteen with Noctuids, six with Geometers and seven with Micro-Lepidoptera. The remaining

thirty-eight are filled with Coleoptera. This is a purely Canadian collection, almost entirely from Ontario. The specimens have in nearly all cases been named by specialists when they were brought together for the Philadelphia Exhibition, and are therefore most valuable for reference and comparison; but unfortunately date and locality labels were not thought of so much importance in those days as they are now, and comparatively few are provided with them.

A walnut cabinet of fifteen drawers contains North American species of Hymenoptera (five drawers). Diptera (two), Neuropteroid insects (two), Odonata (three), Hemiptera (two) and one of Orthoptera. These are for the most part collections made many years ago, with very few recent additions. The Neuropteroid specimens were named by the late Dr. Hagen, of Harvard University. The Society has a very meagre collection of insects outside of the Lepidoptera and Coleoptera, contributions of specimens of any other orders would, therefore, be most acceptable.

In addition to the foregoing, the Society possesses a large number of book-boxes containing a great number of Coleoptera from California, and many specimens of British and exotic Lepidoptera. All the collections are carefully gone over at least twice a year to guard against any injury from Anthrenus or other museum pests.

A NEW SARCOPHAGA FROM NEW YORK.

BY R. R. PARKER, STATE COLLEGE, BOZEMAN, MONTANA.

Sarcophaga fulvipes dissidia, n. subsp.

1914. *Sarcophaga fulvipes nigra** Parker, Proc. Bos. Soc. Nat. Hist., vol. 35, No. 1, pp. 38, 40, 41. Characters.

1916. *Sarcophaga fulvipes* var., Aldrich, *Sarcophaga* and Allies, p. 184.

Holotype ♂.—Collection of C. W. Johnson, Boston, Mass. (♂) Posterior trochanter without "brush;" femur arched, its anterior face without ventral row of bristles (only a single distal bristle present); anterior and posterior faces of tibia each with a

* *S. fulvipes dissidia* was referred to in part one as *S. fulvipes nigra*, but *nigra* has since been found to be preoccupied; therefore, the subspecies is described under the name *dissidia*.

very thick beard of very long, coarse hairs extending full length of tibia; middle femur clothed beneath nearly to distal extremity with long hair, posterior ventral row of bristles represented only by a few short bristles on about distal fifth; tibia clothed beneath on about its distal half with long, dense hair that anteriorly and posteriorly becomes coarser and beard-like, submesotibial bristle absent; vestiture of third ventral plate short and erect; genital segments dull orange, vestiture of both equally long, first large and without marginal bristles (possibly variable).

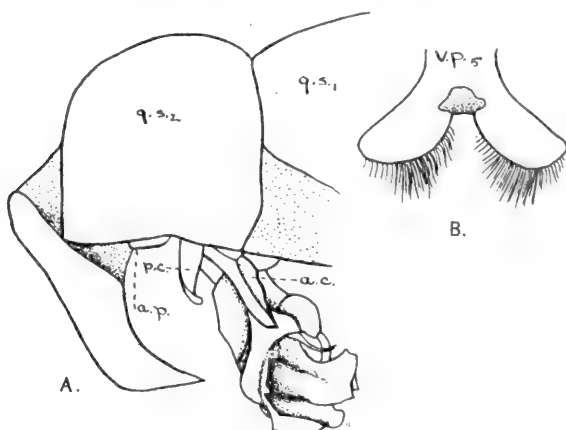


Fig. 7.—*Sarcophaga fulvipes dissidia*, n. subsp. A, Genital segments of ♂; B, fifth ventral plate of ♂.

Head.—Viewed from side, parafrontals and genæ with dark reflections. Breadth of front at narrowest part about three-fifths eye width; cheek height approximately one-third that of eye. Front prominent, sides of frontal vitta slightly converging backward. Second antennal segment dark; third about twice length of second; arista plumose on basal two-thirds. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with yellowish white hair that completely covers the metacephalon. Cheeks clothed with black hair. Gena with a single row of bristle-like hairs near lower eye orbit. Palpi dark.

Chætotaxy.—Lateral verticals absent; vibrissæ inserted just above line of oral margin.

Thorax.—Mesonotum clothed with erect, almost bristle-like

hair. Hairs covering anterior spiracle dark brown basally becoming lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover light yellowish brown with yellowish tips. Epaulets dark.

Wings.—Bend of a fourth vein a right angle; anterior cross-vein more basal than end of first longitudinal; costal spine vestigial; third vein bristly; section III of costa about one and one-fourth times section V; alulae fringed with hair; calypters whitish, margins fringed with white hair.

Legs.—Dark; all tarsi distinctly shorter than their respective tibiae. Posterior trochanter without "brush;" femur cylindrical, arched, clothed beneath with long hair that forms a beard posteriorly; anterior face with but two rows of bristles, an upper and an intermediate, latter not developed distally, of lower row a single distal bristle present; posterior face without ventral row of bristles; tibia curved, anterior and posterior faces each with a very thick beard of very long, coarse hairs extending full length of tibia, latter somewhat the stronger; fourth tarsal segment at least one-half fifth. Middle femur clothed beneath nearly to distal extremity, especially posteriorly, with long hair; anterior ventral row of short bristles complete, posterior row represented only by a few short bristles on about distal fifth; tibia clothed beneath on its distal half or slightly more with long, dense hair that becomes coarser and beard-like anteriorly and posteriorly; submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side and anteriorly with others between them; tibia with a beard-like line of short hairs distally on posterior face (probably absent in small specimens).

Chaetotaxy.—Anterior dorsocentrals slightly reclinate, not weaker than anterior postsuturals; anterior acrostichal absent; last two pairs posterior dorsocentrals strong, anterior to these several pairs that are mostly very weak and scarcely distinguishable from vestiture of scutum; prescutellar acrostichals present; scutellar apicals present; three sternopleurals, middle one weak; lower sternopleura with a single row of bristles, otherwise clothed with long hair.

Abdomen.—Somewhat conical; clothed above with short, reclinate bristles, beneath with somewhat longer, more erect hair.

Ventral plates as a whole, with their sides slightly converging posteriorly though they may appear approximately parallel; vestiture decreasing in length posteriorly, that of third very short and erect. Posterior margin of fourth notum of same colour as genital segments. Fifth ventral plate (v. p. 5) typical.

Chætotaxy.—Second segment without marginal bristles, third with two; fourth with complete row ending ventrally in long hairs.

Genital Segments.—Prominent; dull orange; vestiture of both equally long. First (9 s.1), large, in profile slightly arched, marginal bristles absent; second (9 s.2), rotund, not flattened; anal area small, its upper limit not extending to middle of posterior surface. Forceps darkened, tip very strongly bent forward, in profile vestiture extends to forward bend, prongs approximated to bend.

Genitalia.—Head of penis large and its structure complicated. Tips of posterior claspers (a.c. and p.c.) bent forward, flattened dorso-ventrally. Accessory plates hairy (a.c.).

(♀) Not known.

Described from 1 male specimen.

Range.—Type specimen taken at Niagara Falls, N.Y.

Aside from the striking difference between this subspecies and *Sarcophaga fulvipes* (Macquart), the point of greatest interest is the extremely heavy beards of the hind tibiae, which are the most striking of any species known to the writer. The hairiness of the middle tibia is also unusually long and abundant. Considering the extreme weakness of the middle sternopleural bristle, probably specimens will be found with this lacking, in fact, of the two specimens of *S. fulvipes fulvipes* examined, one has two sterno-pleurals on each side, the second two one side, three on the other. Comparatively, the posterior or lower calypter is very large.

The single specimen described belongs to the collection of C. W. Johnson, of Boston, as does one of the two specimens of *S. fulvipes fulvipes* examined. The latter were taken at St. Augustine, Florida. The genitalia of both subspecies are identical in all respects. The advisability of giving this specimen subspecific ranking may perhaps be questioned, but it seemed to me wiser to err in so doing than that such an extreme variation should be lost sight of. It may be a case of melanism.

S. fulvipes fulvipes Macquart differs from the subspecies just described in the following characters; sides of frontal vitta parallel or slightly converging backward (should probably be same variation in *dissidia*); second antennal segment dull orange; palpi light (dull orange); hairs covering anterior spiracle mostly grayish, bases dark; those of anterior margin of posterior spiracle dark at base only; those of spiracular cover yellowish, perhaps faintly darkened basally; epaulets dull orange, brownish basally (*Ravinia*-like); coxæ, trochanters, femora and tibiæ of all legs dull orange, tarsi brown or brownish orange; anterior dorsocentrals not differentiated except that one or two show anteriorly; anterior postsutural dorsocentrals not differentiated; two or three sternopleurals, middle one weak if three are present; first genital segment with or without marginal bristles, if present very slender and hair-like, several each side of centre; forceps only darkened distally.

The most striking of the differences above noted is the dull orange colour of the second antennal segments, palpi, epaulets and first four segments of the legs. Though all the anterior dorsocentrals are differentiated in the subspecies *dissidia*, this may be a variable character; the absence of marginal bristles on the first genital segment may perhaps be variable. In the smaller of the two specimens of *fulvipes* the bearded character of the middle tibiæ is far less distinct, the anterior tibia lacks a beard-like line of short hairs distally, the posterior beard of the hind tibia is much stronger than the anterior, and the ventral surface of the anterior coxa has an irregular row of bristles at each side only.

AN INTERESTING CASE OF INSTINCT.

BY L. M. STÖHR, ST. ALEXANDER'S COLLEGE, IRONSIDE, QUE.

While collecting last fall branches of Sumach which, on account of their great medullar development, often shelter different kinds of aculeate Hymenoptera, I was fortunate enough to find one that furnishes a striking example of instinct. The stalk referred to had been used as a dwelling by several Hymenoptera, as might be seen from the old cells, whose location is still perfectly noticeable. Later on a woodpecker, having remarked the presence

May, 1917

of the insects, helped itself to a meal at slight cost, pecking three holes; one at 18, the other at 22.5 and the last at 30 cm., below the top of the branch. Notwithstanding the precarious condition of the stalk, opened at not less than four points, an insect thought it still serviceable and turned it into a nest for its progeny—and it must be owned, it did it well.

One cell had been built at the bottom of the canal. A piece of resin formed the floor, a transverse partition of the same substance the ceiling. Up to the present time my observations of Hymenoptera making their nests in pithy plants have not yet furnished me with any instances of an Apoid using resin for the construction of partition. A bee, however, it was, since some yellow powder, which remained in a cell, was proved by microscopic examination to be pollen dust. In Europe the *Heriades truncorum* L. is said to use resin for the same purpose.

After this first cell had been constructed, the insect seemed to feel some misgivings concerning the ultimate fate of its progeny, and left unoccupied that section of the tunnel which extended as far as the lowest orifice bored by the woodpecker. Here the wonderful instinct of the bee reveals itself. It placed a first resin stopper just below the level of this aperture, a second one in the hole itself and a third above. The stopper applied to the orifice closes it, but imperfectly, and does not fill the whole tunnel on the inside. But the two other pieces, above and below, are quite cylindrical and close the tube hermetically. All danger of intrusion from below being thus removed, the bee constructed five other cells above this barricade. Once more it did not make use of the whole length of the tube between the two lateral openings, but stopped its work 2.5 cm. below the second hole. A straight



Fig. 8.—a Holes made by woodpecker.

a' Id. covered with pieces of resin (b').

b Pieces of resin forming barricade.

1-6 Cells separated by resin partitions.

resin stopper, the last one, was applied just underneath this hole, and all the rest of the canal, some 24 cm., was left unoccupied. In the accompanying sketch only the section of the branch containing the woodpecker's holes has been represented.

We see here a case in which a Hymenoptera showed remarkable discernment by filling up an accidental opening in the stalk it had chosen as a home for its young, and which, if left open, would have proved fatal for the further development of its progeny. Moreover, the insect stopped its work in time to avoid a repetition of the same labour. Indeed, it is not easy to explain how the offspring—of moderate size as indicated by the length of the cells—could have made their way through a barricade twelve millimeters thick, like the one near the lowest orifice.

Must we now infer that the insect in question proved itself to be endowed with reason and intelligence? The problem has already been solved. Ferton* quotes a case in which an *Odynerus pasictum* L. covered with clay a lateral fissure several centimeters long. He mentions also two instances in which an *Osmia ferruginea* Latr. stopped up in the same way holes in a shell of a *Helix*. The *Osmia cornuta* Latr. in several cases repaired cracks in the walls of its nest. Of six specimens of *Heriades truncorum* observed by him, three filled up fissures with resin.

The above mentioned author infers from these facts that such actions are mere manifestations of instinct, and says in conclusion: "With Hymenoptera, acts of intelligence are exceptional; often those which seem such are nothing else than its manifestations of a habit but seldom remarked."

NEW COLEOPTERA.—VI.

BY H. C. FALL, PASADENA, CAL.

The preceding articles of this series have appeared at intervals from Aug., 1905, to Feb., 1912—under the caption "New Coleoptera, Chiefly From the Southwest." For the present one and any that may follow, the abbreviated title will be used, even though the majority of new species described may still come from the Southwest.

* Ferton: Sur l'instinct des Hyménoptères. Ann. Soc. Ent. Fr., 1901, pp. 142—144.

***Lathrobium shermani*, n. sp.**

Form moderate; reddish brown, shining, pubescent. Antennæ rather stout, scarcely reaching the bases of the prothorax, outer joints moniliform. Head as wide as long, a little wider behind, the angles broadly rounded, surface rather sparsely punctate. Eyes wanting, but in their place a small, nearly smooth, whitish spot of about the size of the second antennal joint; beneath sparsely punctate, the gular sutures rather widely separated, most approximate at about the middle of their length, where they are distant by about the width of the penultimate joint of the maxillary palpi. Neck one-half as wide as the prothorax, the latter oblong oval, narrower than the head, longer than wide, just perceptibly narrowed behind, the angles all rounded, the posterior ones a little more broadly so, surface, finely rather sparsely, confusedly punctate, with narrow, ill-defined, smoother median line. Elytra distinctly shorter than the prothorax, humeri small, sides divergent, the width at the apex equal to that of the prothorax, punctures without serial arrangement, coarser than those of the prothorax, mutually distant by their own diameters or a little more; wings undoubtedly vestigial or wanting. Abdomen gradually a little widened to the fifth segment, punctuation finer, not close. Legs concolorous; front thighs stout, broadly angulate subapically beneath; front tarsi broadly dilated, hind tarsi three-fifths as long as the tibiæ, basal joint short, terminal joint longer than the two preceding. Length 6.3 mm.; width 1.15 mm. North Carolina, Grandfather's Mt., 4,000–5,000 ft., September. (F. Sherman collector.)

The unique type is a male, having the sixth ventral segment broadly, rather deeply, arcuately emarginate, the segment bearing about the middle of its length on either side of the median line a short, transverse comb of closely placed, porrect, black spinules, about eight in number.

This species is remarkable in being the first blind—or virtually blind—Lathrobiid to be discovered in our fauna. In the European fauna the members of the subgenus *Glyptomerus* are similarly deprived of normal eyes, but the characters of *Glyptomerus*, as given by Casey in his Revision of the American *Pæderini* do not well fit our species. *L. shermani* is perhaps nearest to *Abletobium pallescens*

Casey, in which the eyes, though not lacking, are very small. The species is with pleasure dedicated to its discoverer.

***Tribalister striatellus*, n. sp.**

Rotundate oval, castaneous, moderately shining; above minutely, sparsely, evenly punctulate; elytra 6-striate, the four outer ones subentire, the two inner abbreviated at base; sutural stria punctate, the others scarcely so except near the apex; margin of elytra acute and continuous with that of the prothorax; discal striae entirely without cariniform outer margins. Propygidium coarsely, densely punctate, smoother narrowly along the base; pygidium more finely, sparsely punctate, with intermixed still finer punctures, the latter alone present at apex. Sides of body beneath very coarsely, densely punctate. Otherwise in nearly all respects as in *T. marginellus*. Length 2 mm.; width 1.5 mm.

Rhode Island, Berkley; a single example taken by the writer many years ago under a stone in early spring. It was then identified as probably *T. marginellus*, by Mr. Frederick Blanchard, but a recent comparison with the type of the latter inclines me to the belief that it is specifically distinct. In *marginellus* the upper surface is virtually impunctate except for the coarse punctures along the elytral apex (which are also present in *striatellus*); the so-called elytral striae, after the second, which is very finely impressed, are really not striae at all, but costae, the striae being completely obsolete and traceable only by the slightly different surface lustre along the inner side of the costae; the sutural stria is impunctate, the pygidium is less finely punctate, and the sides of the body beneath are less coarsely and densely so. The region between the hind coxae, involving the apical portion of the metasternum and the basal part of the first ventral segment is broadly depressed—not at all so in *striatellus*. The frontal stria is interrupted medially in *marginellus*, finely impressed and entire in *striatellus*. *Marginellus* was described in 1859, the type being from Maryland, and very few examples have since been taken. *Striatellus* also appears to be excessively rare, and I am not aware that a duplicate exists in collections.

HETÆRIUS.

***Hetærius zelus*, n. sp.**

Oblong, feebly convex above, rufo-ferruginous with fulvous pubescence. Head shining, vertex concave, sparsely punctate,

front and clypeus subimpunctate. Prothorax two-fifths wider than long, disk between the broad impunctate grooves much longer than wide, feebly convex, uniformly rather finely, not closely punctate, each puncture bearing a short, coarse hair; lateral area divided by a deep, transverse sulcus at basal third, the posterior portion globosely convex, rufo-piceous, glabrous, polished, with fringe of hairs along its outer margin; anterior portion slightly narrower than the posterior, of the usual flattened or slightly concave form, sides nearly parallel behind the oblique, apical truncature, surface rather coarsely, closely punctate and pubescent, the hairs becoming denser, longer and recurved along the posterior margin. Elytra slightly wider than the prothorax, one-fifth wider than long, sides feebly arcuate and just visibly converging posteriorly; subhumeral stria two-thirds the length of the elytra, first dorsal nearly attaining the apex, second dorsal three-fourths, and third dorsal two-thirds the length of the elytra, all the striae externally finely cariniform, punctuation fairly close, nearly uniform throughout, hairs short and plumose basally, becoming longer and simple apically where they are intermixed with still longer, sparse, recurved hairs which occur also along the lateral margins. Propygidium and pygidium sparsely uniformly punctured and setose, the pygidium becoming smooth at apex. Prosternum nearly flat at summit, striae sinuate between the coxae, arcuately convergent but not meeting at apical third, interstitial surface nearly smooth posteriorly, becoming closely punctate in front, densely so at apex; sides of prothorax beneath impunctate, numerous punctate in front of the coxae, meso- and metasternum smooth. Legs moderately long, the femora and tibiae sparsely, finely punctate, the latter flattened and expanded as in the allied species. Length (type) 2.25 mm.; width 1.5 mm.; the size practically constant in all examples seen.

Taken at Pasadena, California, October to March, under stones with *Formica pilicornis*. This species is similar to *tristriatus* in a general way, but with elytral striae nearly as in *morsus*, judging from the description of the latter. It is virtually of the same size as *tristriatus*, possibly slightly smaller, and evidently narrower. The cariniform margins of the first and third dorsal striae, which in *tristriatus* are densely squamose throughout their lengths are here not appreciably more densely clothed except near the base of the third stria.

Hetærius strenuus, n. sp.

This name is proposed for a form similar in all general features to *tristriatus* but larger and more densely punctate throughout. In *tristriatus* the head, prosternum posteriorly, legs and pygidium are sparsely, finely punctate. In *strenuus* these parts are all rather densely, more strongly punctate. Length 3 mm.; width 2 mm. In *tristriatus* the length is 2.5 mm.

The type bears label—Santa Cruz Mts., California, April 17, 1900. It occurs with a black *Formica* with dark, rufo-piceous legs. A second precisely similar specimen has been taken at Pasadena by Mr. J. O. Martin—March 31, 1916—in whose collection it now is. It, together with one or more examples of *H. californicus* were found under the same stone in nest of what I believe to be *Formica pilicornis*.

H. loripes Csy. The description recently published agrees so perfectly in all respects except the punctuation of the head with *tristriatus*, that it is difficult to believe it can be really distinct from the latter, more especially since it comes from the region inhabited by *tristriatus*.

H. exiguus Mann. I have a specimen of this species collected by Dr. Fenyes, at Porvenir, New Mexico. As Mann's specimens were all taken at Pullman, Washington, I had supposed my New Mexico specimen to be something new until I made careful comparison with a paratype of *exiguus* kindly given me by Mr. Mann.

H. minimus Fall. This little species—described from Colorado—also occurs in New Mexico. It has been taken at "Lower Pecos" by Dr. Fenyes.

SAPRINUS.

Saprinus carinifer, n. sp.

Broadly oval, black, legs dark rufous, upper surface minutely alutaceous and dull throughout. Head finely rugulose. Prothorax twice as wide as long, sides strongly convergent and nearly straight to apical third; surface very sparsely, minutely, nearly evenly punctate, the sides longitudinally rugulose in about the lateral fourth, side margins fimbriate with very short hairs. Elytra across the humeri one-fifth wider than the sutural length, punctuation baso-medially similar to that of the prothorax, the punctures becoming only slightly larger and closer toward the sides, but

evidently though gradually so toward the apex, where they are separated by about their own diameters; dorsal striae obsolete, represented by fine carinae, the sutural attaining the apex but becoming obsolete near the base; fourth dorsal reaching the apical third, joining the obsolete sutural at base; third to first dorsals increasing in length, the last named entire; oblique humeral obsolete, internal subhumeral extending from base to apex, cariniform throughout; external subhumeral short, impressed. Propygidium and pygidium more coarsely and closely, nearly uniformly punctured. Body beneath coarsely, closely punctate at sides, minutely and sparsely so at middle. Prosternum very feebly convex at middle, the striae horizontal, diverging a little before and behind the coxae, broadly arcuately uniting behind the prosternal apex; interstrial area with a few minute punctures. Anterior tibiae quadridentate. Length 3.5 mm.; width 2.8 mm.

California. Described from a single example taken by Mr. G. H. Field in the mountains on the western border of the Colorado Desert. This is one of the finest and most distinct species in our fauna. The posterior tibiae are scarcely as wide as the middle ones, but are hardly narrowed apically. This fact, together with the nearly flat prosternum, indicates a position between Horn's first and second groups; it may, however, with about equal propriety be included in Horn's group IV. The rugulosity at the sides of the thorax is not due to the increase in size or longitudinal confluence of the punctures; the latter are scattered over and between the rugulosities and remain about as minute and sparse as at the middle of the disk.

***Saprinus ciliatoides*, n. sp.**

Closely related to, and very like *ciliatus*, but on comparison with type of the latter seems distinct by its larger size and generally sparser, more minute punctuation. In the type the elytra are as Horn describes them, "densely aciculate punctate at sides and apex," the punctures well separated only in the baso-sutural region and narrowly along the suture posteriorly. The punctures are in general elongate, a tendency that is evident even where they are sparsest. In the present species the punctures are everywhere nearly round, very sparse and fine on the disk, and even where closest, as at the sides and apex, they are rarely much closer together than

their own diameters. The form, colour, striae, prosternum, etc., are virtually as in *ciliatus*. Length 3.2 mm.; width 2.5 mm. (Length of *ciliatus* 2.5 mm.)

Nevada, Las Vegas. One specimen. I have seen another, apparently the same, placed with the type of *ciliatus* in the Le Conte collection; it was taken by Crotch near San Bernardino, California.

***Saprinus martini*, n. sp.**

Moderately robust, brownish piceous with faint aneous lustre, integuments polished. Head densely punctate. Prothorax ciliate at sides, densely punctate in front and at sides, becoming rapidly but not abruptly smooth in the baso-medial region; the posterior margin punctate. Elytra moderately, strongly and closely punctate throughout, except between the sutural and fourth dorsal striae, the smooth area rather well defined but not sharply limited behind, the punctures extending further forward within the fourth stria than along the suture. First and second dorsal striae attaining the apical third, third and fourth dorsals sub-equal and shorter, sutural entire and joining the fourth dorsal; internal subhumeral oblique, continuous with the humeral, parallel with and as long as the first dorsal; external subhumeral short, distinct from the marginal. Propygidium and pygidium densely but not confluent punctate, the punctures becoming finer at the apex of the latter. Prosternum rather strongly convex but not compressed, the striae divergent and terminating in foveae, which are more remote than usual from the prosternal apex. Margin of front tibiae about 6-denticulate, each denticle bearing a stout spinule. Length 2.4-3 mm.; width 1.8-2.2 mm.

California. Described from two examples taken by Mr. J. O. Martin in Palm Canyon, on the western border of the Colorado Desert. This species is of the same form and general appearance as the common *fimbriatus*; this latter, however, having the prosternum compressed, belongs to a different group. *Martini*, by its prosternal character, belongs to Horn's group VI, and by the ciliated margins of the prothorax is nearest *ciliatus*. In the latter the punctuation of the elytra is more aciculate, the second dorsal stria shorter than the third, and the prosternal foveae are less distant from the apex.

***Bactridium californicum*, n. sp.**

Similar in general appearance to *striolatum*, to which it is

most nearly allied by the characters used in Horn's table.* Form a little less robust than in *striolatum*; colour reddish brown, the elytra more rufous, with a small, diffuse, darker scutellar spot and the apical third, piceous; antennæ and legs rufotestaceous; surface distinctly reticulato-alutaceous, feebly shining. Head and prothorax coarsely not closely punctate. Head a little narrower than the prothorax, the latter quadrate with obtuse angles; sides straight, just perceptibly convergent posteriorly, margin feebly crenulato-denticulate, disk flattened medially. Elytra a little wider than the prothorax, finely striate, the striæ distinctly, rather closely punctate. Pygidium and last ventral segment very coarsely, closely punctate; segments 2-4 each with a single transverse series of coarse, elongate, closely placed punctures; coxal lines of first ventral distinct, nearly or quite attaining the posterior margin of the segment. In the male the last ventral segment is shorter than the three preceding united, the tip truncate. In the female the last segment is fully as long as the preceding, oval at tip. Length 2-2.3 mm.; width .55-.65 mm.

Southern California, Ojai Valley, March, under bark of dead sycamore. A good series of this species taken by the writer has stood in his collection for more than twenty years without a name. As compared with *striolatum* it is a little less robust with differently coloured elytra, more distinctly alutaceous integuments, less irregularly punctured prothorax, and elytral striæ almost completely attaining the apex. In the single example of *striolatum* before me the elytral striæ are more abbreviated, with numerous irregularly placed punctures at apex. As compared with *striatum*, the only other species of this genus that enters California, the present species is a little larger and stouter, with better defined elytral striæ and much more coarsely punctured under surface.

Sphindocis, new genus.

Closely allied to *Orthocis* in its elongate parallel, slightly depressed form, subglabrous surface, posteriorly margined elytral suture, and simple apex of the anterior tibiae. The maxillary palpi are stout, the last joint widely truncate, instead of pointed as in *Orthocis*, antennæ 11-jointed, the basal joint stout, oval, 2nd similar but smaller; 3rd as long as the 2nd but more slender, about twice as long as wide; 4th to 8th gradually shorter, the 8th

*Trans. Am. Ent. Soc. XII, 1879, p. 265.

slightly transverse; 9th to 11th forming a loose club. Head and clypeus simple in the male, in which sex there is a small setigerous fovea near the base of the first ventral segment.

***Sphindocis denticollis*, n. sp.**

Rufotestaceous, strongly shining, prothorax and elytra coarsely, closely, uniformly punctate; head similarly but not quite so coarsely so. Prothorax one-third wider than long, sides parallel and broadly arcuate, margins narrowly, abruptly reflexed and quadridenticulate. Elytra scarcely wider than the prothorax, slightly more than twice as long as wide, sides parallel to apical two-fifths, apex evenly rounded. Beneath coarsely, closely punctate anteriorly, abdomen except the basal segment finely and sparsely so. Length 3.75 mm.; width 1.25 mm.

California (Alameda Co.). A single male. If we exclude the Rhipidandrinae this is the largest Ciside known to me. In its size and denticulate thorax it somewhat suggests *Odontosphindus*. The surface, as in *Orthocis*, is not perfectly glabrous, each puncture bearing a very minute hair.

SEASONAL IRREGULARITIES IN THE
OCCURRENCE OF DRAGONFLIES.

BY E. M. WALKER, TORONTO.

The exact composition of the dragonfly fauna of a given locality is subject to frequent change. The effects of erosion on the beds of streams, the deposition of sediment and the accumulation of organic debris in lakes and ponds are constantly producing gradual changes of environment which react on the Odonate fauna, as on other groups of aquatic life, resulting in time in the disappearance of many of the original resident species and the invasion of new forms better adapted to the altered conditions. The drying up of water-courses, due to the clearing of the forests, the pollution of streams and the filling of ponds and swamps are also causing the disappearance of many species from the affected localities, while other species previously unknown in the district find suitable breeding-places in newly created bodies of water, such as result from damming streams, the construction of canals, drainage ditches through swamps and along railways, gravel pits and other excavations, etc.

May, 1917

But apart from the changes due to alterations in their breeding-places, additions to the local list of dragonflies in well-worked localities are of frequent occurrence and are doubtless generally due to the great powers of rapid and sustained flight possessed by these insects, and the tendency of many species to wander far afield from their place of emergence. This wandering tendency in some species amounts to a true migratory instinct, and it has been recently shown in a very interesting article by Howard J. Shannon* that certain species such as *Anax junius*, *Libellula pulchella* and *Tramea lacerata*, together with other insects, notably the Monarch Butterfly (*Anosia plexippus*), follow regular annual migration routes which are closely similar to those of birds. I have never witnessed such a migratory flight, although they have been frequently reported, but it may be of some interest to record some desultory observations I have made, which seem to indicate that some of our Odonata habitually fly distances of many miles during their ordinary foraging excursions, and that the occurrence of large numbers of a particular species in a given locality does not necessarily indicate that they were bred from water in that vicinity. They also illustrate the point already referred to, viz., the frequent occurrence in a particular locality of stray individuals of species not normally resident there.

These observations were made, for the most part, at De Grassi Point, on the west shore of Cooke's Bay, Lake Simcoe, Ont., where I have been collecting and observing dragonflies during a majority of the past 15 years, and they relate chiefly to the species of *Æshna*, to which genus I gave special attention for several years, while accumulating material for my monograph of the group. This genus is, moreover, one that is of particular interest in this connection, as the species are all large insects of powerful and wide ranging flight, and are better represented than any other genus of Odonata in the vicinity of De Grassi Point.

I have described elsewhere** the occurrence at De Grassi Point during certain years, of vast numbers of *Æshna canadensis* E. Walk. and *A. constricta* Say, and have noted that the swarms

* Insect migration as related to those of birds. The Scientific Monthly, vol. 3, No. 3, p. 227, Sept., 1916.

** The N. Am. Dragonflies of the genus *Æshna*, Univ. Toronto Studies, Biol. Ser., No. 11, 1912.

were observed during very warm, still weather. The past two seasons (1915 and 1916) presented a remarkable contrast in weather conditions, and an equally marked contrast in the numbers of dragonflies in flight at the "Point." The season of 1915 was almost continuously cold and wet and dragonflies were so scarce that it was hardly worth while collecting them. The summer of 1916, on the other hand, was unusually hot and dry, particularly during the months of July and August, when *Æshna* is chiefly on the wing. This season was remarkable for the abundance of several species of dragonflies, notably *Æshna canadensis*, *A. constricta*, *Leucorrhinia intacta*, *Libellula pulchella* and *Sympetrum obtrusum*.

Almost immediately after my arrival at the Point, on July 12, 1916, I noticed that *A. canadensis* was very plentiful among the scattered trees along the edge of a dense wood and in a somewhat open grove of pine and oak. The hot, dry weather, which was to last nearly all summer had already commenced. On the 19th the dragonflies were so numerous in some places that one could scarcely take a step without flushing one or more from the trunks and branches of the trees. I often saw two or three on a single trunk, and once noted five on one dead branch.

Being curious to know whether the exuviae of this species would be correspondingly abundant, I visited the nearest marsh at the outlet of Wilson's Creek, a sluggish stream about three-quarters of a mile to the northwest, and another at the outlet of Whitefish Creek about a mile and a half to the south. A prolonged search at both places yielded only five exuviae and one full-grown nymph. Not a single adult was seen at either creek. I had always supposed that these two creeks were the principal breeding places of these species, as there are no others within several miles, but my doubts were now aroused. The absence of adults was expected as they always leave their breeding places soon after emergence, but the scarcity of nymphs and exuviae was significant.

On July 24 I left Lake Simcoe, returning on August 5. *A. canadensis* was now quite scarce in the woods, but *A. constricta* was beginning to appear and became daily more plentiful. By about the 15th its numbers had so increased that it was even more abundant than *A. canadensis* had been. Copulating pairs were frequently seen throughout August and in early September, steer-

ing their erratic course in the open or sometimes resting on low branches.

On August 18 I witnessed the largest flight of *Æshna* I have ever seen. They were first noticed about 5 p.m., flying a few feet from the ground over the grassy spaces and roadway just behind the cottages along the lake front. They were hawking after other flying insects such as midges (*Chironomidæ*), which were very abundant, and each dragonfly appeared to restrict its movements to a more or less definite area. In certain spots they were so abundant that there seemed to be about one for every square yard of ground surface. The day was hot but the sun somewhat obscured by the smoke of distant forest fires. The insects flew continuously, never being seen to rest. A number were captured, all proving to be *constricta*, males predominating. As the sun set they rose higher and began to disperse, and at 7.10 p.m., though still numerous, their numbers had greatly diminished and they were flying at about 30 or 40 feet from the ground. At 7.15 p.m. they had almost entirely disappeared.

On the same day earlier in the afternoon I visited Wilson's Creek to ascertain whether the swarms of *A. canadensis*, which had left the woods, had migrated there for breeding purposes, and also whether *A. constricta* or its exuviae were present. I found the former species in considerable numbers but nothing was seen of *constricta*. The numbers of *canadensis*, however, were quite insignificant as compared with those seen about the woods earlier in the season.

From now on *A. canadensis* gradually diminished in numbers, while *constricta* continued to be plentiful throughout August and in early September. A small number were seen at Wilson's Creek on Sept. 3, but they were flying high and apparently none were engaged in oviposition. Their numbers now began to dwindle at De Grassi Point, although there were still a few about the place when I left on Sept. 23. As they evidently did not go to Wilson's Creek to oviposit, or at most in small numbers, I went on Sept. 13 to the wide marshes at the mouth of the Holland River, about $3\frac{1}{2}$ miles from the Point. It was too cool for dragonflies to be flying in large numbers, but I saw a considerable number of *Æshnas* on the wing and found several others resting in the marsh grass.

All I could identify were *constricta*, and I felt satisfied that they would have appeared in much larger numbers had the weather been favorable. The Holland River is the principal source of Lake Simcoe and winds for many miles through wide prairie-like stretches of open marsh. I believe, therefore, that this river is the chief breeding-place for both species of *Æshna* and that the vast majority of individuals which spread over the countryside during their foraging excursions, ultimately return there to oviposit. I received reports of the occurrence of immense numbers of large dragonflies, presumably *Æshnas*, from the neighbourhood of Big Bay Point, almost ten miles north of De Grassi Point, and I am strongly of the opinion that these also came in large measure from the Holland River.

On the basis of this habit of wandering many miles from their breeding-places an explanation may be offered of the prevalence of these species of *Æshna* at De Grassi Pt. and other localities during warm seasons, and their scarcity during cool seasons. Warm weather induces activity in dragonflies and on hot, sunny days *Æshna* is frequently in almost ceaseless flight, while in cool, dull weather it scarcely flies at all. Hence, in warm seasons they spread to localities, more or less remote from their breeding-places, which under other conditions they do not reach at all. It is thus quite probable that the actual number of dragonflies which emerge from their breeding-places is not appreciably affected by the temperature of the surrounding air. It is also possible, however, that their numbers after emergence may be more rapidly decimated by their enemies in cool seasons than in warm, owing to their relative inactivity under these conditions.

The nomadic habits of *Æshna* may also be illustrated by the following instances of occasional or sudden appearances at De Grassi Point of species of this genus, other than *canadensis* and *constricta*.

On Sept. 9, 1916, I spent part of the afternoon at Wilson's Creek, watching the *Æshnas* patrolling the marshy banks of the stream near its mouth. I had supposed they were all *canadensis*, but on capturing one I was surprised to find that it was *A. eremita* Scudd, a common northern species, which I had never taken here before. My next capture was also *eremita*, both being old males

and one of them decidedly worn. The third specimen was *canadensis*, as were apparently the majority, though I took very few others.

On Sept. 19 I noticed *Æshnas* flying about the pastures where *A. constricta* had been so abundant, and at first sight I took them for this species, which was still abroad, though in declining numbers. My suspicions were aroused, however, on seeing them fly to rest upon the trunks and branches of trees, a habit not characteristic of *constricta*, so I captured one and it proved to be *A. verticalis* Say, a species which until then I had not seen that season. Several others of both sexes were taken with only one *constricta* among them, and during the few remaining days I spent at the Point, i. e., until Sept. 23, *verticalis* was the only species noticed about the pastures. All were old individuals, most of the females having broken abdominal appendages. This species is of rather regular occurrence at the Point but always appears late and in fully mature, if not worn, condition, and I have never found the nymph nor seen the adult in the vicinity of the marshes in this locality. I believe, therefore, that it does not breed here to any extent.

On Sept. 10, 1915, at about the same spot where *verticalis* was seen in 1916, I took a male of *A. tuberculifera* E. Walk., a rare species, never known before from this locality, although regional. On July, 1, 1905, a single male of *A. sitchensis* Hagen was captured by Mr. A. L. Walker, and on Sept. 2, 1906, I took a female of *A. subarctica* E. Walk. Both of these are northern species, the normal southern limits of whose range is far north of Lake Simcoe. They have not been seen here since.

Two other species of *Æshna* are known from De Grassi Point, *A. clepsydra* Say, of very rare occurrence, and *A. umbrosa* E. Walk., which is a regular resident of the upper shadier parts of the creeks, and is always common but never appears in swarms.

As regards the general Odonate fauna of De Grassi Point, several points of interest may be noticed here. The ecological conditions are not very varied, and the number of regular resident species is consequently rather small. In all, fifty-three species have been taken, all within an area of about a square mile; but of

this number no less than 13 species were captured on one occasion only. Ten of these are represented by single specimens the other three by two each. Of two others (*vide infra*) nymphs have been found but no adults.

The ten species represented by single specimens include, besides the species of *Æshna* already mentioned, *Epiæschna heros* Fab., ♂, with a broken wing, found floating on the lake; *Boyeria vinosa* Say, ♀, found ovipositing; *Didymops transversa* Say, ♀; *Erythemis simplicicollis* Selys, ♀; *Libellula luctuosa* Drury, ♂; *Sympetrum scoticum* Donov., young ♂; and *Hagenius brevistylus* Selys., exuvia. A specimen apparently of the last-named species was also seen floating on the lake, from a sailboat. The three other species are:—*Tetragoneuria canis* MacLachlan, 2 ♂s taken within a few minutes of each other at Wilson's Creek; *Cænagrion resolutum* Hag., a pair in copula from the same locality, and *Æshna eremita* Scudd., 2 ♂s as already mentioned. Some of these species evidently breed here occasionally or permanently in small numbers, while others are doubtless strays from other localities.

The two species as yet found only in the larval state are *Chromagrion conditum* and *Cordulegaster* sp., both of which were noticed for the first time in 1916. The nymphs of the former were taken from the upper part of Whitefish Creek on Sept. 10. I have never seen the adults in this vicinity but it is quite possible that I have overlooked it, if restricted to this spot. As to *Cordulegaster*, I have been searching for this elusive creature ever since my interest in dragonflies began, but I have never yet seen a living adult of any of the Eastern species that I can remember, though fragments of a specimen of *C. obliquus* found in a box of remnants, all apparently from De Grassi Pt., testify to my having once taken a specimen of this genus here. Of its capture, however, I have no recollection, and I had long given up hope of ever finding another *Cordulegaster* of any species in this locality. Imagine then my surprise and delight when on Sept. 11, 1916, while pulling up the masses of water-cress from a small brook (the upper part of Wilson's Creek) I brought to light two full-grown nymphs of the coveted genus. I continued the search and succeeded in getting all I could carry home. Some of these are still alive, and I hope to obtain adults from them during the coming season.

That such a large, conspicuous insect as *Cordulegaster* could have escaped my observation all these years, if it has been here continuously, seems at first sight improbable, and yet in this case I am inclined to believe, from the numbers of nymphs present in the creek, that the species is a regular resident. The adults of *Cordulegaster* are short-lived and their season of flight is probably over soon after the usual time of my arrival at Lake Simcoe in late June or early July, and my visits to their haunts, which have not been frequent, have probably all been too late.

In conclusion we may summarize the following points, which are suggested by the foregoing observations.—

1. Certain species of dragonflies are much more abundant in certain localities during warm seasons than during cold seasons.
2. This abundance is probably not due to the emergence of large numbers of individuals from their breeding-places, but to the greater activity of flight in warm weather, whereby the insects are dispersed to localities not visited in cooler seasons.
3. The Odonate fauna of a restricted locality contains a large percentage of transient resident species and stragglers from other localities, such species varying greatly from year to year.

THE NORTH AMERICAN SPECIES OF *HABROCYTUS* (CHALCID-FLIES).

BY A. A. GIRAULT, GLENNDALE, MD.

Generic Characters of Habrocytus.

The scutellum bears a more or less distinct cross-carina (or indicated as such) before apex (except in *medicaginis* and *borrowi*). The spiracular sulcus is present, foveate (exceptions noted). The clypeus is finely striate. The genus differs from *Pteromalus* mainly in mandibular structure but the abdomen is less flat, longer (conical) and the neck of the propodeum not usually conspicuous, but short and variable between the species. The propodeal spiracles are long and elliptical (smaller in *canadensis*). The types of all the species have been seen. The following table is based on the females:

May, 1917

Antennæ inserted somewhat below the middle of the face. Parapsidal furrows not complete. Mandibles 3- and 4-dentate.

1. Fore-wings with a large, smoky area under the whole of the marginal vein. Propodeum with a large neck, tricarinate. Abdomen produced beneath, with a very short petiole. Pedicel shorter than funicle 1, the latter twice longer than wide. Coxæ and femora concolorous, the middle tibia infuscated, the caudal so at base. Scutellum without a cross-suture before apex (or an indicated one). Clypeus sinuate.....*borrowi*, n. sp.

2. Fore wings hyaline.

Ovipositor not extruded. Coxæ above metallic, the legs lemon yellow, the antennæ yellow-brown. Clypeus sinuate rather deeply at apex. Antennæ inserted but a little above the ventral ends of the eyes. Spiracles at the base of a broad hollow, bounded by the lateral carina and a carina laterad of the spiracle, no sulcus. Propodeum tricarinate. Pedicel and funicle 1 subequal.....*onerati* (Fitch).

Coxæ concolorous, the femora brown or washed with metallic or metallic. Scape yellow.

Clypeus distinctly concave or sinuate at distal margin.

Propodeum tricarinate and with a very short neck (irregular rugæ between the carinæ). Funicle 1 somewhat over twice longer than wide, twice the length of the pedicel, 6 a half longer than wide. Tibiæ white. Marginal vein nearly twice the length of the stigmal. Femora usually washed. Funicle and club

black.....*rhodobæini* Ashmead = (*languriæ* Ashmead).

The same but the femora usually deep metallic, the tibiæ golden yellow, the funicle joints somewhat shorter, the flagellum brown...*phycidis* Ashmead (= *piercei* Crawford).

The same as *phycidis* but the tibiæ brown, white at tip, no median carina on propodeum, the foveæ of spiracular sulcus minute.....*cerealellæ* (Ashmead)

The same, but the femora and tibiæ reddish brown, the tips of the last two pairs of tibiæ broadly white. Funicle joints as in *phycidis*. Propodeum with a distinct neck. Abdomen more like that of

Pteromalus.....*rhodobæini rosæ*, new var.

Clypeus sharply incised at meson so as to appear bidentate there. Femora metallic. Flagellum black. Propodeum without a neck, scaly, impunctate, tricarinate. Scutellum without a faint cross-carina. Stigmal vein subequal to the marginal.

Funicle 1 a little longer than pedicel, somewhat longer than wide, 6 a little wider than long. Small species.....*medicaginis* Gahan.

Clypeus truncate or subtruncate. Femora barely metallic. Tips of tibiæ white, the femora and tibiæ brown yellow; striæ of clypeus faint; antennæ yellow, funicle 1 barely longer than the pedicel, longer than wide, 6 wider than long; stigmal vein somewhat shorter than marginal. Otherwise as in *rhodobæini*, but small.....*aulacis*, n. sp.

The same, but a half larger, the tibiæ and tarsi lemon-yellow, the flagellum black, the club yellowish, the spiracular sulcus absent, the median carina irregular. Clypeal striæ distinct.....*arkansensis* n. sp.

Coxæ and femora concolorous, scape concolorous.

Clypeus rather deeply concaved or sinuate. Propodeum tricarinate, the neck short. Pedicel and funicle 1 subequal. Caudal tibia reddish brown, pale yellow at tip. Spiracular sulcus short, complete, bifoveate. Spiracle curved.....*franciscanus* n. sp.

Ovipositor extruded for a fourth or more the length of the abdomen.

Clypeus sinuate at distal margin, striate.

Coxæ and femora concolorous, the scape yellowish brown. Ovipositor extruded for a fourth the length of the abdomen.

Propodeum with a distinct neck, tricarinate. Funicle 1 twice longer than wide, much longer than the pedicel. Usual otherwise.....*dux* n. sp.

Coxæ alone concolorous, the legs white. Scape concolorous except at base. Ovipositor three-fourths the length of the abdomen.

The same as *dux* but slender (as in *Belonura singularis* Ashm.), no spiracular sulci, the spiracle oval, small, the lateral carina absent, no neck. Head subquadrate. Funicle 1 thrice longer than wide.....*canadensis* n. sp.

Habrocytus rhodobæini rosæ Girault.

Two pairs, Brooklyn, N. Y., February 9, 1913, from rose (A. S. Berquist). The *Habrocytus rosæ* Ashmead, in Annals Ent. Soc. of America, VIII, 1915, p. 278.

Types.—Catalogue No. 20414, U. S. National Museum, one male, two females on two tags.

Habrocytus medicaginis Gahan.

Several females reared in connection with *Bruchophagus funebris* from red clover seeds, St. Paul, Minnesota (W. Williamson).

Habrocytus aulacis Girault.

Two females, Wooster, Ohio, reared in connection with an *Aulax* gall.

Types.—Catalogue No. 20418, U. S. National Museum, two females on tags, a head and a caudal leg on a slide.

Habrocytus quinquecarinatus Girault.

This species has no spiracular sulcus. It differs from the other species in being varicoloured.

Habrocytus franciscanus Girault.

Three females, San Francisco County, California, July.

Types.—Catalogue No. 20416, U. S. National Museum, the females on tags, a head, the caudal legs and a fore wing on a slide.

Habrocytus borrowi Girault.

One female in the U. S. National Museum from Colorado. Dedicated to George Borrow.

Type.—Catalogue No. 20417, U. S. National Museum, the specimen on a tag, the head, caudal legs and a fore wing on a slide.

Habrocytus arkansensis Girault.

Males, females reared in connection with *Isosoma*, Garfield, Arkansas (T. S. Wilson).

The males have the antennæ entirely yellow, the legs (except the coxæ), golden yellow.

Types.—Catalogue No. 20419, U. S. National Museum, three females on tags, a head and caudal legs on a slide.

Habrocytus dux Girault.

One female, Canobie Lake, New Hampshire.

Type.—Catalogue No. 20441, U. S. National Museum, the female on a tag, the head and a caudal leg on a slide.

Habrocytus canadensis Girault.

Toronto, Canada (Wm. Brodie).

Type.—Catalogue No. 21071, U. S. National Museum, a tag and a slide.

Habrocytus cerealellæ (Ashmead).

Parasite of *Sitotroga cerealella*, Philadelphia, Pennsylvania.

Types.—Catalogue No. 6115, U. S. National Museum, tags and a slide.

Catolaccus anthonomi Ashmead has 3- and 4-dentate mandibles but I am not sure how many ring-joints, apparently three (but female type has lost antennæ).

The species *obscuripes* has an obscure cross-carina on the scutellum near apex, despite what I have said in the Annals of the Entomological Society of America, IX, 1916, p. 292. It does not belong here (tridentate mandibles).

THREE NEW SPECIES OF JASSOIDEA FROM MISSOURI.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

With the addition of the following new species the total number of Jassoidea reported as occurring in Missouri* is brought to 155.

Tinobregmus moodii n.sp. Near *pallidus* Osb. but slightly larger, with loræ exceeding the middle of the clypeus and elytra not extending to pygofer.

Vertex narrow, broadening anteriorly; front narrow, elongate; clypeus elongate, at its widest point equaling width of front, only slightly emarginate at apex; beak extending to hind coxæ; cheeks long, flaring; loræ narrow, elongate, exceeding the middle of the clypeus. Pronotum short, length less than half that of width, posterior border slightly sinuate. Elytra ovate, not extending to the pygofer; veins rather indistinct. Length of female $6\frac{1}{2}$ mm. to tip of ovipositor; male $4\frac{3}{4}$ mm. long.

Colour, pale tawny yellow, vertex and pronotum of female unmarked, tip of vertex of male irregularly marked with fuscous; front and clypeus marked with a broad, longitudinal vitta on each side which coalesce just before apex of clypeus. Pronotum bordered laterally with fuscous; elytra subhyaline to opaque with a heavy, black border at the apex. Dorsal side of abdomen irregularly marked; pectoral pieces black; venter fuscous with whitish border; ovipositor black.

Genitalia, last ventral segment of female distinctly sinuous, ovipositor extending beyond the pygofer; male plates long and narrow with acute apex.

Described from one female and one male which are deposited in the collection of the U. S. National Museum. Specimens were taken in a sweeping from weeds growing on a high ridge of the Ozark Mt. range, near Branson, Mo., August 22, 1916, by Mr. F. M. Moody in whose honor the species is named.

*Note—Species of Jassoidea occurring in Missouri have been recorded as follows:

Gibson, E. H. and Cogan E. S. A preliminary list of Jassoidea of Missouri with notes on species. Ohio Jr. Sci., Vol. 16, No. 2, December, 1915.

Horsfall, J. H. Additions to the list of Missouri Jassoidea. Ohio Jr. Sci., Vol. 16, No. 8, June, 1916.

Gibson, E. H. Additions to the list of Missouri Jassoidea. Canadian Entomologist, Vol. 49, No. 2, February, 1917.

May, 1917

Euscelis ozarcensis n. sp. Resembles *arctostaphyli* Ball but can be distinguished by greater length of last abdominal segment of female, the lateral angles of which are more produced, also by having a much more simple colour pattern on vertex.

Vertex obtusely angulate, apex produced, length two-thirds that of width and about two-thirds length of pronotum. Front broad and only slightly convex. Clypeus parallel-margined, hardly twice as long as broad. Elytra short and broad, apical cells small, central anteapical cell only slightly constricted on inner side. Length 3 mm.

Colour, decided brown, with anterior margin of vertex and costal margin of elytra bright yellow. A transverse dark brown or black band between anterior portion of eyes. Posterior margin of vertex bordered with cream. Pronotum and elytra of same intensity of colour. Scutellum light brown. Elytra nervures prominent, very light brown to cream. Face marked with dark cross-bars. Cheeks irregularly marked. Below dark; tibia pale, pygofers blotched.

Genitalia, last ventral segment of female twice longer than penultimate, lateral angles produced; two slight notches, one on either side of ovipositor. Male plates triangular and twice the length of valve.

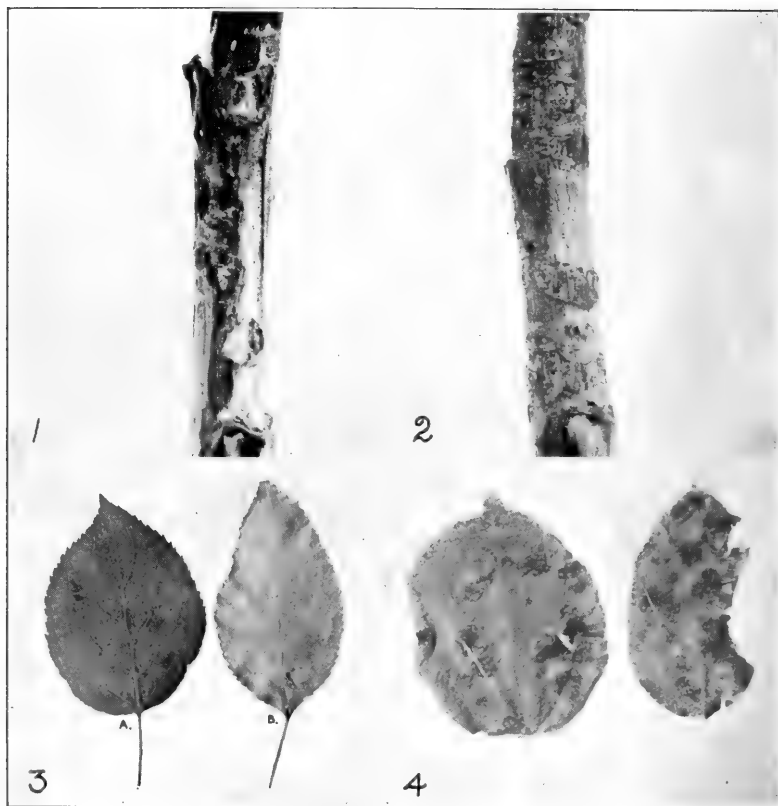
Described from two females and two males collected by the author in the Ozark Mts. near Branson, Mo., August 21, 1916, and now deposited in the collection of the U. S. National Museum.

Typhlocyba modesta, n. sp. Near *rosæ* Linn., but differing in female posterior segment being distinctly notched, and in larger size. Face considerably longer than broad, clypeus less than one-fourth the entire length of face, superior angle of face obtuse. Length of pronotum hardly twice that of vertex. Scutellum large. Last ventral segment of female produced and rather deeply notched.

Colour, light yellow to cream, vertex slightly tinged with deeper yellow. Thorax, scutellum and abdomen concolorous. Elytra hyaline with apex tinged with yellow. Eyes brown; tip of ovipositor and tarsal claws dark brown to black. Length $3\frac{3}{4}$ mm.

Described from two females and one male collected by the author at Charleston, Mo., during May and June, 1916, and which are now deposited in the collection of the U. S. National Museum.





WORK OF APPLE LEAF MITES (P. 189).

The Canadian Entomologist.

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No. 6

POPULAR AND PRACTICAL ENTOMOLOGY.

TWO APPLE LEAF MITES OF ECONOMIC IMPORTANCE.

BY W. H. BRITAIN, PROVINCIAL ENTOMOLOGIST FOR NOVA SCOTIA.

THE "SILVER-LEAF" OR "RUSTY-LEAF" MITE.

(*Phyllocoptes schlectendali* NALEPA.)

During the summers of 1912 and 1913, which the writer spent in British Columbia, he had an excellent opportunity for observing the work of the mite *Phyllocoptes schlectendali* Nalepa, this species being extraordinarily abundant in the Okanagan Valley and other parts of the Dry Belt.

It is most commonly found attacking the leaves of the apple, and though it cannot often be considered a serious enemy of the foliage, the result of its work is conspicuous and peculiar. The presence of the mite makes itself apparent by a decided silvery appearance of the leaves, which, in severe cases, is very pronounced and can be detected from a considerable distance. This appearance is due to the formation of an air space between the epiderm and the palisade cells due to the punctures of the mites. A tree so affected bears a striking resemblance to one attacked by the disease Silver-Leaf, said to be caused by a fungus (*Stereum purpureum* Pers.)

This is not the only case in which a silvery appearance is brought about by the work of mites. On plums, bad infestations of Red Spider (*Tetranychus bimaculatus*) produce a somewhat similar appearance, though not so characteristic, and mites feeding upon elm leaves have been observed to produce similar symptoms. It was first thought that all such trees were suffering from Silver-Leaf, which is not surprising, since both these troubles are very abundant in British Columbia and are often present on the same tree. It was only, however, when trees that had been sprayed with nicotine sulphate did not develop the disease that this diag-

nosis was thrown in doubt and the true cause discovered. Though this type of injury is very common in British Columbia and appears to have been noticed quite widely in the United States and Canada, the amount of actual harm which the mites accomplish in this way is questionable, and is probably of little importance in most cases. Parrott (1 and 2) who appears to have been the first to have recorded this species in America, says that this species is very common on apple foliage in the United States, that it is more common in the United States than on the continent, and that it seems to have possibilities of developing to greater economic importance. P. J. O'Gara (3) who records this mite from Southern Oregon, noticed its work on the apple foliage, which, however, he did not regard as serious. He states that the mite is chiefly important as a pest of pears, the foliage, terminals of twigs and even the fruit being injuriously affected. He describes the injured foliage as presenting a peculiar russet appearance on the underside, and as being somewhat curled, as though with drought. The terminal shoots and the fruit is also attacked, being russeted and cracked as a result of the punctures of the mite. With serious attacks, the whole tree is said to have a brownish appearance, giving the trouble the name "Rusty Leaf," by which it is known in the Rogue River Valley, Oregon. We have never noticed such severe attacks to the pear in British Columbia, but it would not be surprising to find that such existed, so prevalent is the mite throughout the fruit-growing sections. It would appear from the foregoing that, though this pest is known to be prevalent throughout the United States and Canada, it has never been regarded as a serious enemy of apple foliage, and only locally as a serious pest of pears.

Through the summer of 1912 numerous specimens of apple twigs were sent to the office of the Provincial Entomologist at Vernon, disfigured in a curious way by brownish incrustations on the bark of one and two-year-old wood. These injured areas were generally more or less circular in form, though sometimes of an irregular shape. A crack usually separated the healthy from the diseased wood, and the epidermis was frequently ruptured. This injury appeared to be most pronounced on wood of the Northern Spy, though other varieties suffered to some extent. A careful

examination of the incrustations revealed nothing of a parasitic nature.

The next year similar injured twigs were submitted for examination in even greater quantity. In particular, a number of nursery firms complained of heavy loss to their Northern Spy stock from being rendered so unsightly as to be quite unmarketable. One firm, situated in the Okanagan, was compelled to destroy a large quantity of Northern Spy stock, as a result of this trouble. It appeared, on further examination of affected twigs, that the year following the appearance of the trouble, the injured areas frequently dropped out, thus rendering the injured tree more unsightly than before. Further examination of the incrustations still revealed nothing, but so serious had the situation become, that it was decided to follow the matter up carefully, in order to determine definitely the cause of the trouble.

The writer left British Columbia in the fall of that year and was unable to prosecute this matter further. However, Mr. J. S. Dash (5), then working under the direction of the Inspector of Fruit Pests, examined a number of injured twigs during the month of October. He found them to contain hundreds of hibernating mites, whose identity could not be ascertained with certainty at the time, since they were immature. At the request of the writer, a number of affected nursery trees were sent to Truro, kept over winter and planted out the following spring. In July the silvery appearance, characteristic of the work of *Phyllocoptes schlectendali*, became apparent on the leaves, which, on examination, were found to be covered with mites belonging to this species.

It would appear from our observations that the mites, which feed on the foliage during the summer months, make their way to the twigs in the autumn where they enter an old egg blister of the Rose Leaf-hopper (*Empoa rosæ*), a common apple pest throughout the province, or of the Apple Leaf-hopper (*Empoasca mali*) or through a lenticel, and there they develop their hibernating incrustations, which render the affected trees so unsightly. As an enemy of nursery trees and particularly of Northern Spys, this mite is, therefore, of considerable importance, since stock so disfigured is unmarketable. The actual harm done to such

stock is slight and, as a pest of older trees, it cannot be considered as being of a very serious nature.

THE APPLE LEAF MITE (*Eriophyes malifoliae*).

Regarding this mite Parrott (2) says: "This is a vagabond species and is found in association with *Eriophyes pyri* and *Phyllocoptes schlectendali*, upon the under surface of apple leaves." From this it is apparent that he regards this mite as of secondary and minor importance and not able, by itself, to inflict much injury. While we have never seen any particularly destructive outbreaks, it is possible that this mite may prove to be of greater economic importance than is commonly supposed, at least under conditions that exist in the Okanagan.

In view of the resemblance between the injuries produced by the former species discussed and a fungous disease, it is an interesting fact, that this mite causes symptoms strikingly like another fungous trouble, viz., Apple Scab (*Venturia pomi*). The mites work on the underside of the leaves, concealed by the pubescence, and the first indication of their work is in the form of more or less olive-green, circular spots on the upper surface, which gradually darken until they become dark brown in colour. These spots become slightly raised above the surface of the leaf, forming a saucer-shaped hollow on the underside. These symptoms are so suggestive of apple scab, that it is not surprising that they have been mistaken for this trouble even by those familiar with the disease. Not only were the leaves affected but the tender shoots were also attacked, causing them to wither and become brown and dead. This appearance is suggestive of the damage done to pears by *Phyllocoptes schlectendali*, as described by O'Gara, but was noticed where only *Eriophyes malifoliae* was present. This type of injury was very prevalent during the summer of 1913.

Unfortunately we were prevented from making observations regarding the hibernating habits of this species, but we feel certain that a careful study of its life history and habits would reward research. It is altogether possible that these two species discussed in this article are responsible for much more damage than is com-

monly attributed to them. In particular it seems well within the range of possibility that they may be responsible for many of the blotched apples and the disfiguration of other species of orchard fruits that is so common throughout the fruit districts, since both species have been found feeding in large numbers on fruit so affected. Which of the species discussed here, if either, is responsible for such injury, can only be determined by experiment.

The problem of control should be a comparatively simple one, since both species are readily destroyed by the summer sprays of lime-sulphur, or by weak solutions of nicotine sulphate.

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3. O'Gara, P. J. Economic Importance of the Mite *Phylloctes schlectendali* Nalepa. Science, N. S., 36 : 835-836 (1912).
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EXPLANATION OF PLATE X.

- Fig. I. Injury to apple twig by hibernating incrustations of *Phylloctes schlectendali*.
- Fig. II. Appearance of injury the next season.
- Fig. III. A, Leaf infested with *Phylloctes*; B, Uninjured leaf.
- Fig. IV. Leaves injured by *Eriophyes malifoliae* (Parrott).

THE OCCURRENCE OF *EUMERUS STRIGATUS* FLN. IN CANADA.

BY ARTHUR GIBSON, ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

In the Entomological Record for 1915¹ a record of this species is included, namely: "Victoria, B. C., reared from narcissus bulbs, April 7—9, 1910, (E. A. Wallace)." In the Record for 1916², the occurrence of the species at Ottawa, Ont. (August, 19, 1904, Fletcher) is mentioned. Recently we received a specimen of *Eumerus strigatus* from Montreal, Que., which was collected in a greenhouse, on Feb. 5, 1917, by Mr. J. I. Beaulne. In October, 1910, Dr. Hewitt, found the larvæ abundant in the greenhouse of Mr. E. A. Wallace, Victoria, B. C.

This European insect which has been recorded as a pest of onions, shallot, roots of Iris and bulbs of narcissus, hyacinth and Amaryllis, has been referred to in economic literature as the Bulb Moon-fly, the Lunate Onion Fly and the Small Narcissus Bulb Fly. Felt³ first recorded the species from America from specimens reared in New York State from the roots of Iris, and referred to the fact that Dr. F. H. Chittenden had informed him that the fly was reared in the Bureau of Entomology at Washington, in 1906. The taking of a specimen at Ottawa in 1904, however, by the late Dr. Fletcher, is evidently the first record of the occurrence of the species in America.

Emerus strigatus is now widely distributed in North America, having been found in the United States in the States of California, Texas, Connecticut and New York, and in Canada in the provinces of Quebec, Ontario and British Columbia.

Theobald⁴ has found as many as 17 larvæ of the species in one bulb and states that "there is no doubt that these small narcissus and other bulb flies are the cause of much loss, but are not, it seems, so widely spread as *Merodon*; still the number one finds

¹46th Annual Report of the Entomological Society of Ontario.

²47th Annual Report of the Entomological Society of Ontario.

³New York State Museum, 27th Report of the State Entomologist, 1911.

⁴Report on Economic Zoology for year ending Sept. 30, 1911.

in samples of bulbs purchased shows that it has to be dealt with just as much as the larger maggot."

MacDougall⁵ describes the larva of *Eumerus strigatus* as measuring "half an inch and over when full grown. It is greyish yellow in colour and has a distinctly wrinkled appearance. The mouth hooks are brown and the respiratory processes at the front end are brownish-red. The rounded hind end is brown at the tip and has a projection on each side with a process which ends in the breathing pores between the projections."

TWO NEW SAWFLIES (HYMEN.).

BY E. P. FELT, ALBANY, N. Y.

The peculiar Xylids with the remarkably developed third antennal segment, are comparatively rare and unusually interesting. It, therefore, seems desirable to publish the description of a recently discovered species in this group, and also one of a related Pamphilid.

Pleroneura borealis, n. sp. The sawflies described herein were collected at Lake Clear, N. Y., June 7, 1907, and in the key given by Rohwer, would run to *P. fulvicornis* Roh., a larger Californian species exhibiting some differences in colour from this species.

Male.—Length 4 mm. Anterior margin of clypeus broadly rounded; narrow, deep furrows extend from the base of the antennæ and unite above the median ocellus, median foveæ, forked ventrally, extending to the base of the ocellus; terminal anterior segment shorter than the preceding. Head and thorax opaque with close, fine punctures; maxillary palpi large, probably 7-jointed, the second segment distinctly shorter than the anterior femora, the first joint about one-half as long as the second. Claws with a minute tooth basally. Hypopygium roundly truncate, first recurrent vein free from the first transverse cubital. Head black. Thorax brownish black. Abdomen reddish brown. The antennæ, clypeus, labrum, tegulæ, the dorsum of the abdomen

⁵Journal of the Board of Agriculture, London, October, 1913. June, 1917.

apically, the distal half of the venter of the abdomen and femora rufous; tibiæ and tarsi mostly yellowish; tibiæ and the distal tarsal segments apically reddish brown.

Female.—Length 5.5 mm., to tip of ovipositor 7 mm. Similar to the male and black, except as follows: Antennæ dark brown, the third segment almost blackish; clypeus, labrum, mandibles, tegulæ, the apex of the abdomen dorsally, the posterior margins of the basal segments and the distal third of the abdomen ventrally (except the black ovipositor), femora and tibiæ yellowish or ferruginous; the tarsi reddish brown, the posterior darker.

Described from two males and one female.

***Acantholyda ferruginea*, n. sp.** The sawfly described below differs so greatly from any accessible descriptions, that we have been unable to refer it to known species. It was taken on the summit of Mount Marcy in the Adirondacks, July 31, 1913.

Male.—Length 7 mm. Head brownish black, coarsely and irregularly punctured and with anterior and posterior yellowish, ovate, orbital spots; mandibles fulvous. Antennal segments 21, the first black, with irregular, narrow, yellow annulations basally and apically, the second yellowish brown or dark brown, yellowish apically; third segment shorter than the fourth and fifth combined, the others successively shorter; the third to ninth yellowish brown, the distal segments mostly dark reddish brown. Thorax and abdomen brownish black, the segments of the latter narrowly margined with yellow, the markings on the three posterior segments angulate. Wings suffused with ferruginous, only two sub-marginal cells, the second cross-vein wanting; venter, coxæ and femora brownish black the tibiæ and tarsi dark fulvous.

ERRATUM—PLATE IX.

We regret that the lettering for Plate IX, in our May issue, illustrating Messrs. Brittain and Saunders' article, "Notes on the Black Apple Leaf-hopper," was omitted. The figures are arranged from top to bottom of page: Figs. 1-4 on left, Figs. 5-7 on right. The magnifications are as follows; Fig. 1 (x 43), Figs. 2-4 (x 29), Fig. 5 (x 23), Fig. 6 (x 19), Fig. 7 (x 17.5).

TWO NEW APHID GENERA AND SOME NEW SPECIES.

BY C. P. GILLETTE, FORT COLLINS, COL.

In Canadian Entomologist, vol. XL, 1908, p. 67; and in Entomological News, vol. XX, 1909, p. 119, the writer described and figured a peculiar aphid from *Carex* under the specific name of *ballii* and placed it in the genus *Brachycolus*, with a remark to the effect that it did not seem to belong to any known genus.

The appearance of Mr. A. C. Baker's paper, "Synopsis of the Genus *Saltusaphis*," in the January (1917) number of the Canadian Entomologist, leads me to publish the characterization of a new genus—*Thripsaphis*—with *ballii* Gill. as the type, as this aphid seems to me generically distinct from *Saltusaphis* Theobald. In giving his characterization of this genus, Theobald says:

*"Head very large. . . Cornicles small, cup-shaped. . .
†Cauda in both forms bifid. . . Body hairs fan-shaped or sickle-shaped," and attention is specially called to the single cross-vein in the hind wing and the jumping habit of the type species, *scirpus*. None of these characters apply to *ballii* except the venation of the hind wing, and that does not hold for other very closely allied species.

***Thripsaphis*, n. gen.**

General form very long and slender; eyes without ocular tubercles; antennæ 6-jointed; anterior wings normal in venation, but the first cross-vein in the hind wing weak, or absent in some cases, and easily overlooked when present, if mounted in balsam; cornicles represented by pores only; cauda strongly knobbed; precaudal tergite entire; anal plate strongly bi-lobed; gonapophyses .2; body hairs few and not blunt ended or in form of flabellæ; vertex prominent, and the oviparous females, so far as known, have wax glands on the lateral ventral surfaces of the abdomen, just caudad of the cornicle pores, from which are secreted wax

*African Aphididae—Part II, in Bulletin of Entomological Research, Vol. VI, pt. II, p. 138, 1915.

†I have examples of *Saltusaphis scirpus* from Theobald. It is evident that he mistook the extended and strongly bi-lobed precaudal tergite for a bi-lobed cauda. The cauda has a large and typical knob with a narrowly constricted neck which was mistaken by Theobald for the anal plate. The anal plate is bi-lobed also, as in the Colorado species, *flabellus* Gill.
June, 1917.

threads that are used by them with which to cover their eggs. Males, so far as known, apterous and very small.

When the alate form of *ballii* was described, the writer had but a single example in balsam, which did not show the first cross-vein of the hind wing and it was so described and figured, and is probably one of the reasons why Mr. Baker includes this species in *Saltusaphis*. Many alate examples of closely allied species have since been taken which plainly show the first cross-vein, even after being put in balsam, so I do not think the presence or absence of this vein should be given generic importance in the group to which *ballii* belongs.

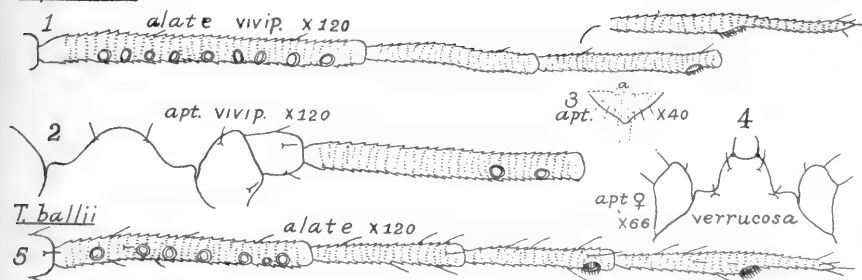
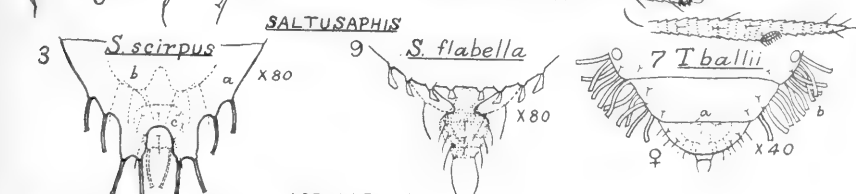
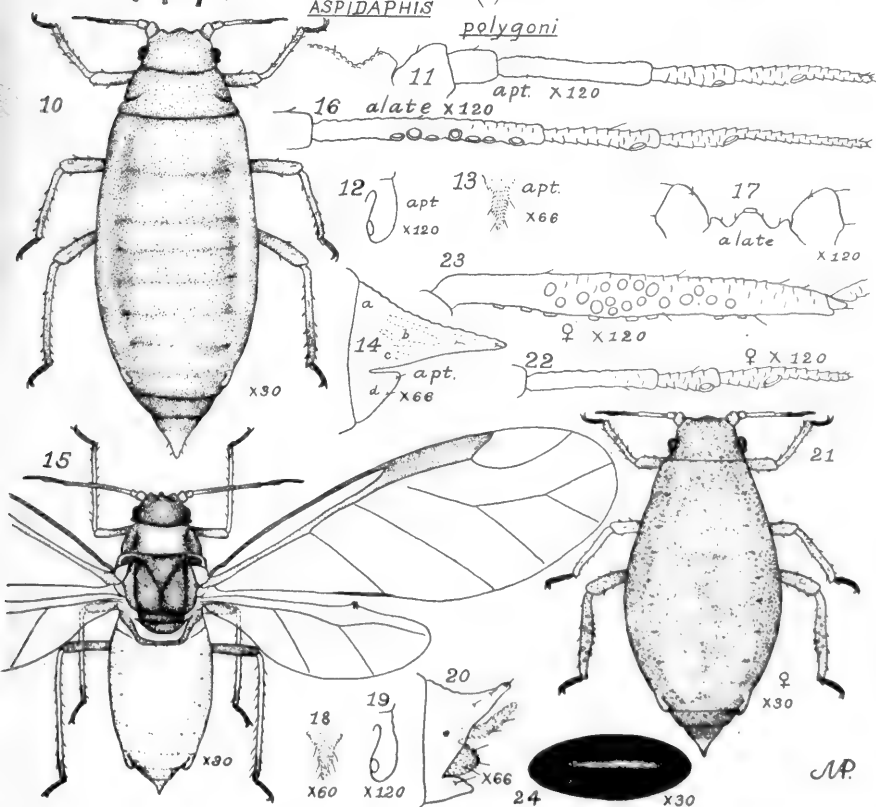
While *Callipterus flabellus* Sanb. does not have the bifid pre-caudal tergite that is so strong a character in the type of the genus *Saltusaphis*, I believe Mr. Baker is right in placing it with that genus, for it qualifies in all other important respects and does have a large eighth tergite bearing tuberculate hairs as in *scirpus* Theobald.

***Thripsaphis ballii* Gill.**

This species is separated rather easily separated from, at least, three other Colorado forms that are congeneric with it, by the short antenna, which, in the alate form, has about 7 small circular sensoria on the third joint, and in the apterous form none, the absence of the first transverse vein in the hind wing of the alate louse, the moderately produced vertex, the short and broadly rounded eighth tergite and the stout femora of the apterous viviparous form. See Plate XI, figures 5, 6, 7.

***Thripsaphis verrucosa*, n. sp.**

In the original description of *ballii* the writer mistook for it the egg-layer of what now proves to be a distinct but closely allied form. See Canadian Entomologist, vol. XL, p. 67 (apterous viviparous female), and plate III, figures 12 and 14. This form must be segregated from *ballii*, and for it I suggest the specific name *verrucosa*, because of the prominent projection on the vertex. See also Plate XI, figure 4, accompanying this paper. The other forms for the year have not been thoroughly worked out, so are held for later descriptions.

*T. producta*THRIPSAPHISSALTUSAPHISASPIDAPHIS

Thripsaphis producta, n. sp.

Our collections indicate this as the most abundant species in Colorado occurring upon *Carex*. With the generic characters given above, only a brief characterization of this species seems necessary.

Alate Viviparous Female.—General colour blackish, legs and antennæ black; length 2.00; wing $2.50 \times .70$; hind tibia, .60; antenna, 1.15; segments of antenna in following proportions: III, 15; IV, 9; V, 8; VI, 7; spur, 4; sensoria on joint III, 9 to 11, rather large and slightly transverse; venation of fore wing normal and veins rather heavy; hind wing with first cross-vein weak or lacking, usually quite plainly seen before clearing in balsam. See figures 1, 2, 3.

Apterous Viviparous Female.—Colour (in balsam) dark yellowish brown, darkest on lateral margins and back of cornicles; legs black; antennæ black to near base; vertex convex, being rather strongly produced at the middle; length of body 2.10; width .70; antenna .95; third segment with 2-3 small circular sensoria near distal end; segments III, .30; IV, .18; V, .15; VI, 13; spur .08; hind tibia .48; beak very short, but little surpassing the first pair of coxæ; femora not specially thickened for jumping; hairs few, short, and simple; anal plate bi-lobed; 8th tergite produced and rather sharply rounded posteriorly. Figures 2, 3.

Aspidaphis, n. gen.

Wing venation normal; antennæ 5-jointed, less than one-half as long as the body; antenna and body very free from hairs, no lateral tubercles on prothorax or abdomen; cornicles weak, recumbent, shorter than hind tarsus, without flange, somewhat clavate, and with opening lateral, on the inner side, near the distal end; eighth tergite of abdomen developed into a very large triangular shield, which, in the type species, extends well beyond the end of the cauda. Eyes not tuberculate.

The three specially diagnostic characters are: Antenna, 5-jointed; cornicles without flange and with side opening, and the large precaudal shield. See figures 10 to 23.

Aspidaphis polygoni, n. sp.

This aphid, combining some rather unusual structures, was

first taken by Mr. L. C. Bragg upon knot-grass or door-weed, *Polygonum* sp., at Ft. Collins, Colo., in July, 1907, and we have had it under observation each year since and throughout the growing season.

Apparently, the different species of *Polygonum* are the sole food plants of this species. It imitates the colour of the under-side of the leaves and the stems of the plants upon which it feeds so perfectly that it is seen with some difficulty, and it is sporadic in its habits. The lice also have the habit of working beneath the bracts at the bases of the leaves where they are out of sight. The different stages may be described as follows:

Apterous Viviparous Female.—Colour green, with tips of the antennæ, the tarsi, distal ends of tibiæ, and extreme tip of cornicles, dusky to blackish; form of body long and tapering posteriorly to the point of the pre-caudal shield; body, legs and antennæ very free from hairs; antennæ upon slight tubercles, 5-jointed; joints 4 and 5 and spur sub-equal; joint 3 as long as 4 and 5 together, total length about .40; legs short and stout; cornicles a little more than one-half as long as the hind tarsi, placed at extreme lateral margins of abdomen, weak, recumbent upon the abdomen, clavate, rounded and without flange at the distal end, the opening being on the inner side near the end; cauda long, slender and entirely hidden from above by a triangular shield-like projection of the pre-caudal tergite which extends beyond the end of the cauda; lateral margins of prothorax and abdomen without spines. See plate XI, figures 10 to 14.

Winged Viviparous Female.—General colour, pale yellowish or greenish yellow, eyes blackish, head, mesothorax above and below, metathorax above, antennæ and tarsi dusky brown; wing veins heavy and dusky brown to blackish; length 1.40; antenna .40 to .50; wing 1.80; head rather broad and flat, the antenna being widely separated and not upon distinct tubercles, 5-jointed; medium ocellus prominent on the vertex; joints of the antenna: III, .18; IV, .08, V, .07; spur, .08. Joint 3 has about 6 to 8 sensoria; joint IV, 1 near the distal end; joint VI, 1 large and 4 or 5 small ones; antennal segments free from hairs; prothorax rather large and without lateral tubercles; cornicles, concolorous with the abdomen, situated on extreme margins, weak and lying against

the side of the abdomen and about one-half as long as the hind tarsus; terminal segment of the abdomen, above, in the form of a long, triangular plate with an acute upturned apex, beneath which is the cauda, which is rather narrow and directed downward; beak not attaining the second pair of coxæ. See figures 15 to 20.

Oviparous Female.—The oviparous female differs from the viviparous form in being more robust, a little shorter and brownish or slightly rusty in colour. The antennal joints and other characters are substantially as in the viviparous form. The hind tibiæ are moderately swollen and have 20 or more circular sensoria on their middle one-half. Figures 21–23.

The eggs are bright green in colour when deposited upon the stems of the host plant, but soon turn shining black on exposure. See figure 24.

While we have never found this louse abundant, we have seldom had trouble to find examples when looked for at any time during the growing season.

EXPLANATION OF PLATE XI.

Thripsaphis producta. 1, antenna of alate viviparous female; 2, vertex and first three joints of antenna of same; 3, eighth tergite of abdomen with cauda and anal plate beneath showing gonapophyses (a).

T. verrucosa. 4, vertex showing tubercle.

T. ballii. 5, antenna of alate female; 6, vertex and antenna of apterous female; 7, terminal segments of oviparous female showing gonapophyses (a), and wax threads (b).

Saltusaphis scirpus. 8, showing terminal segments of abdomen of apterous female—(a) large bi-lobed 8th tergite, (b) bi-lobed anal plate, (c) knobbed cauda.

S. flabella. 9, eighth tergite, bi-lobed anal plate (dotted), and cauda of apterous viviparous female.

Aspidaphis polygoni. 10, apterous viviparous female (stem mother?); 11, vertex and antenna of same; 12, cornicle of same; 13, cauda of same; 14, lateral view of 8th and 9th segments, (a) 8th tergite, (b) cauda, (c) anal plate, (d) genital plate of No. 10; 15, alate viviparous female; 16, antenna of same; 17, vertex of

same; 18, cauda of same; 19, cornicle of same; 20, lateral view of 8th and 9th segments of same; 21, oviparous female; 22, antenna; 23, hind tibia and, 24, egg of No. 21. The enlargement is indicated with each figure. Original, Miriam A. Palmer, Illustrator.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA) PART III.

BY CHARLES P. ALEXANDER, CORNELL UNIVERSITY, ITHACA, N. Y.

This paper is a continuation of the preceding articles under the same title (Can. Ent., vol. 48, p. 42-53, 1916; vol. 49, p. 22-31, 1917). The species here considered include a small number of subapterous forms, these belonging to the genera *Chionea*, *Limnophila*, and *Tricyphona*.

I am indebted to Mr. W. L. McAtee, Mr. R. C. Shannon, Mr. C. W. Johnson and other gentlemen mentioned in the paper. I am especially indebted to Mr. L. O. Jackson for specimens herein described. Unless stated otherwise, the types are in the collection of the author.

Subfamily *Limnobiinæ*.

Tribe *Limnobiini*.

Genus *Limnobia* Meigen.

***Limnobia indigena jacksoni*, subsp. n.**

Male.—Length 7.4 mm.; wing 8.8 mm.

Female.—Length 7.1 mm.; wing 7.6-8 mm.

Similar to typical *indigena* O. S. (Northeastern America), differing as follows:

The medial præscutal stripes are continuous and well-defined behind, the interspaces obscure, not bright yellow; pleura largely dark brown, this including also the outer faces of the coxæ. Wings similar, the ground-colour more grayish, the brown clouds less distinct and more extensive, pale grayish brown; these markings include a broad, continuous seam along and slightly before the cord and the apex of the wing; basal deflection of vein *Cu*₁ close to the fork of *M*. Abdominal tergites with the cross-bands poorly defined, the sternites suffused with brownish.

June, 1917.

Holotype, ♂, Geneva Park, Grant, Colorado, altitude 10,000 feet, July 16, 1916 (L. O. Jackson).

Allotopotype, ♀, July 21, 1916.

Paratopotype, ♀, altitude 9,500 feet, July 22, 1916.

This fly will probably be found to be a valid species. It differs from *indigena* in the dusky brown body coloration, the gray wings with a more extensive brown seam, the position of the basal deflection of *Cu*₁, etc.

Tribe *Eriopterini*.

Genus *Erioptera* Meigen.

***Erioptera (Empeda) cinereipleura*, sp. n.**

Male.—Length 4 mm.; wing 4.5 mm.

Similar to *E. stigmatica* O. S. (Northeastern America) but the body-coloration clearer gray throughout. Antennæ darker, brown, the male with very long verticils.

Mesonotal præscutum gray, the pseudosutural foveæ and the tuberculate pits large and conspicuous, black, the latter closely approximated, separated by a distance less than the diameter of one. Pleura clear light gray, not reddish gray as in *stigmatica*. Legs with the femora yellowish basally, soon passing into brown. Wings grayish subhyaline, the stigma clear but distinct (fig. 6).

Abdominal tergites dark brown, contrasting with the yellow hypopygium.

Holotype, ♂, Hall Valley, Colorado, August 11, 1915 (E. J. Oslar).

***Erioptera (Empeda) noctivagans*, sp. n.**

Wings pale dusky with an indistinct brown seam along the cord.

Male.—Length 3.2 mm.; wing 4.7 mm.

Female.—Length 3.8–4.1 mm.; wing 5.6–5.8 mm.

Male.—Rostrum and palpi black. Antennæ black, the second and third antennal segments enlarged, the flagellum without exceedingly elongated verticils as in *stigmatica*, *cinereipleura*, etc. Head dark gray.

Thorax grayish brown, the humeral portions bright yellow; præscutum before the pseudosutural foveæ slightly brightened. Pleura and sternum dark coloured with a sparse, gray pruinosity;

pleural membranes yellowish brown. Halteres yellow. Legs with the coxæ and trochanters yellowish, remainder of the legs brown. Wings dusky gray, the stigma distinct; an indistinct, brown seam along the cord; veins dark brown. Venation as in fig. 5.

Abdomen light brown with a broad, blackish, sublateral stripe on either side of the tergites; hypopygium small, brownish yellow; sternites brown.

Female.—Slightly larger than the male, the basal segments of the antennæ not so enlarged; flagellar segments oval, those toward the tip more attenuated; humeral portions of the thorax whitish yellow; abdominal tergites with the sublateral stripes somewhat narrower; tergal valves of the ovipositor pointed at their apices.

Holotype, ♂, Maywood, Alexandria Co., Virginia, October 19, 1915, (W. L. McAtee); at light.

Allotopotypes, ♀, October 15, 1915.

Paratopotypes, 2 ♀s, October 16–19, 1915.

Type in the collection of the United States Biological Survey.

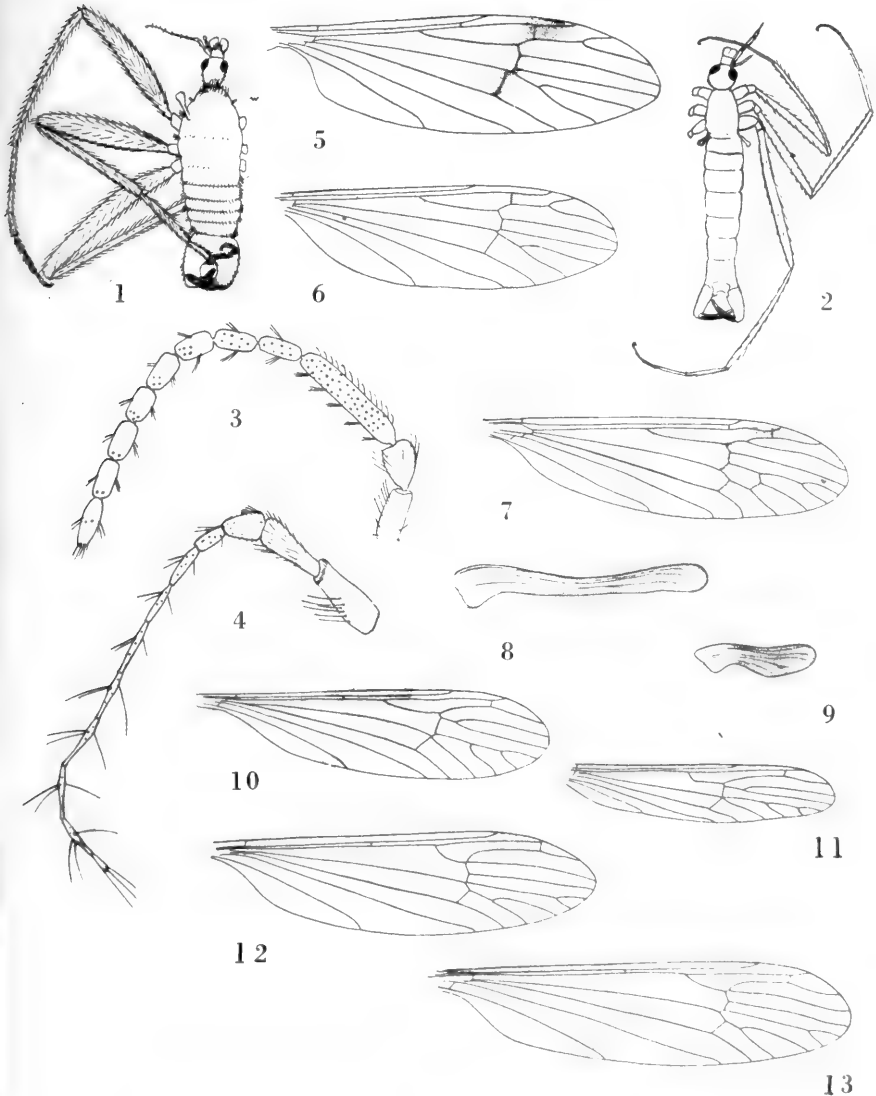
A key to the nearctic species of the genus Erioptera (Empeda).

1. Cell 1st M_2 closed; body-coloration yellow.....2.
Cell 1st M_2 open; body-coloration gray or brown.....3.
2. Basal deflection of Cu_1 beneath the middle of cell 1st M_2 ; vein R_2 oblique, diverging strongly from vein R_3 (Eastern United States).....*nyctops* Alex.
Basal deflection of Cu_1 before the fork of M ; vein R_2 not oblique, running parallel with vein R_3 (Western United States).....*alicia* Alex.
3. Wings gray with an indistinct, brown seam along the cord; verticils of the male antennæ not greatly elongated (Eastern United States).....*noctivagans*, sp. n.
Wings subhyaline without a brown seam along the cord, only the stigmal region slightly darkened, verticils of the male antennæ greatly elongated.....4.
4. Body-coloration clear gray, including the thoracic pleura (Rocky Mt. Region).....*cinereipleura*, sp. n.
Body-coloration reddish brown, the pleura reddish gray (Northeastern United States).....*stigmatica*, O. S.

Chionea Dalman.

These interesting subapterous crane-flies have been the subject of much discussion during the past hundred years. They were long supposed to be wingless but this is incorrect, the wings being present although greatly reduced (see fig. 1, *w*). The legs of the males of many species are strongly incrassated and hairy. The evolution of the group from full-winged ancestors has been indicated by the author in another paper (Proceedings Academy Natural Sciences of Philadelphia, p. 529, 530; 1916). The closest known relative of *Chionea* I believe to be the full-winged *Pterochionea bradleyi* Alexander (British Columbia), a fly that is interesting and suggestive in many ways. Its structure may be compared with that of *C. primitiva*, sp. n., when the relationships existing will be better understood.

The antennæ of *Pterochionea*, unlike the normal eriopterine crane-flies, have undergone a reduction in the number of the antennal segments, this reduction being brought about by a curious fusion of the five basal segments of the flagellum (fig. 3), that has been termed the fusion-segment. In *Pterochionea* this fusion-segment is elongated and the five sets of verticils are well-preserved. In *Chionea*, and, to a lesser extent, in *Crypteria* Bergroth, the fusion-segment has shortened up into a conical structure that is scarcely longer than the succeeding flagellar segment, and the five sets of verticils are either lost or very reduced. Beyond the fusion-segment in *Pterochionea*, *Crypteria* and *C. primitiva*, there are nine flagellar segments, thus accounting for the sixteen segments of the normal eriopterine organ. In order to determine, if possible, how the further reduction in segments in *C. valga*, *C. nivicola* and the other species had been brought about, Mr. C. W. Johnson has very kindly examined the types and fresh metatypical specimens of *C. valga* Harris in the collection of the Boston Society of Natural History. Under the date of March 11, 1917, he writes in part: "Under the binocular and with a fresh specimen I seem to see traces of segmentation in the three conspicuous joints of the flagellum, with 12 verticils and bristles, showing, as you say, nine. In the old specimens, including the type, I cannot make out clearly the weaker segmentation, but the verticils seem to be the same; all of the specimens have the three long bristles on the



terminal segment, one a little below the apex." The sketch supplied by Mr. Johnson indicates that the first of the flagellar segments has two of these weak segments, the next two have three each while the short terminal segment is not further divided, these totalling up to the nine distinct segments in *C. primitiva*. It will be seen from the figures (fig. 3) that the flagellar segments in *Pterochionea* are all short-cylindrical; in *C. primitiva* (fig. 4) the basal segments are short with short verticils, these segments gradually becoming more attenuated and provided with longer bristles, the last segment shorter with three terminal bristles.

The male hypopygia of *Chionea* and *Pterochionea* show a peculiar, powerful type of genitalia, consisting of a massive pleurite and a single elongate pleural appendage (figs. 1, 2). In *Crypteria* the appendages are small, two in number and quite normal. Thus in the structure of the antennæ, *Chionea* comes closest to *Crypteria*, but in the hypopygium the condition is remarkably close to *Pterochionea*. There can be little doubt but that these two genera, with perhaps others yet to be discovered, are the direct ancestors of our familiar snow-flies, *Chionea*. As stated in another paper, this interpretation will place the group at the very end of the eiopterine series.

***Chionea primitiva*, sp. n.**

Size large; form stout; entire body hairy; head elongated; antennæ with nine flagellar segments beyond the fusion segment.

Male.—Length 5.8 mm.; diameter across thorax, 1.5 mm.

Mouth parts yellowish brown; palpi dark brown. Antennæ elongate, the scapal segments yellowish brown, the flagellum darker; first segment of the scape a little broader basally, with a group of long bristles on the outer face; second segment narrowed, basally enlarged, darkened and provided with bristles beyond the basal portion; fusion-segment of the flagellum conical, with short verticils; it is shorter than the second segment of the scape but longer than the following segment of the flagellum; beyond the fusion-segment are nine distinct segments, increasing in length toward the tip of the organ, the verticils also increasing in length from the base outward, those of the first four segments shorter than the segments that bear them, the others very long, longer than the segments that bear them; the terminal segment is smaller,

enlarged apically and bearing at its tip three very long bristles. The frontal prolongation of the head bears a group of about eight stout bristles. The head behind the eye is large, elongated and prominent, bearing many strong verticils. Head yellowish.

Thorax reddish yellow, the region of the mesonotal scutum and scutellum with abundant strong black bristles. Halteres prominent, light yellow. Legs with all the femora enlarged, yellowish; tibiae yellow; tarsi black. Wings very small but evident (fig. 1, *w*) about as long as the third flagellar segment of the antennae.

Abdomen stout, the tergites with their caudal portions provided with abundant long, black bristles; sternites with similar but shorter hairs. Male hypopygium powerful, the pleurites stout, the appendage enlarged basally and provided with an inner basal tooth, in the angle of which is a tuft of stout, black hairs; the appendage is shorter than the pleurite.

Holotype, ♂, Cascade, Owasco Lake, Cayuga Co., New York, November 15, 1915 (Bishop and Crosby).

***Chionea noveboracensis*, sp. n.**

Body-coloration dark brownish gray; ovipositor of the female very elongated.

Female, somewhat shrunken, length about 3.5 mm.

Mouth parts and palpi brownish black. Antennae black, the fusion-segment of the flagellum short; remainder of the flagellum broken. Head very dark brown with a gray pruinosity and numerous dark bristles.

Thorax brownish gray. Halteres elongate, brownish yellow. Wings very small but evident, dusky gray. Legs with the coxae prominent, dark brown; femora and tibiae brown, the tarsi dark brown; femora not incrassated.

Abdomen very dark brown with a gray bloom, the tergites with long, golden hairs on the caudal portion. Female ovipositor exceedingly long and slender, the tergal valves much longer than the sternal pair, slightly upcurved, narrowed and obtuse at their tips. The tergal valves of the ovipositor are about as long as the thorax.

Holotype, ♀, Coy Glen, Tompkins Co., New York, altitude 800 feet, Feb. 25, 1917 (R. C. Shannon).

The type is in the collection of the collector.

***Chionea gracilis*, sp. n.**

Size small; form very long and slender; head round; femora not swollen.

Male.—Length 3.9 mm.; diameter across the thorax, .6 mm.

Mouth parts and palpi yellowish. Antennæ yellow, the scapal segments long and slender, the flagellar fusion-segment long and slender, conical. Head rounded, yellowish.

Thorax brownish yellow. Halteres yellow. Legs yellow, the tarsi scarcely darkened.

Abdomen long and slender, about twice the length of the combined head and thorax. Male hypopygium not conspicuously enlarged, the pleurites slender, the appendage very long and slender, curved, narrowed at the tip and nearly as long as the pleurite.

The body and legs are provided with a sparse covering of short, pale hairs.

Holotype, ♂, Ithaca, Tompkins Co., New York, December 21, 1914.

The description of *C. scita* Walker indicates a form that is longer than *C. valga* Harris (*aspera* Walker) and having black antennæ. It seems probable that *C. scita* is the female of *C. valga*, the females of *Chionea* having the legs more slender than those of the male, and with the body more elongate and slender (see Emerton's figures, in Johnson's paper, "The Snow-fly, *Chionea valga* Harris," *Psyche*, vol. 14, p. 43; 1907).

A key to the Eastern American species of the genus Chionea.

1. Body-coloration gray.....*noveboracensis*, sp. n.
Body-coloration reddish or yellowish.....2.
2. Form long and slender; (length of the male less than 4 mm.; diameter across the thorax about .6 mm.); all the legs elongate, slender, not at all thickened.....*gracilis*, sp. n.
Form stouter; (length of the male over 4 mm.; diameter across the thorax 1 mm. or over); at least the posterior legs of the male incrassated.....3.

3. Antennæ with 12 segments; all the femora of the male incrassated; size larger, (length of the male about 6 mm.; diameter across the thorax 1.5 mm.).....*primitiva*, sp. n.
 Antennæ with 7 segments; the hind femora of the male conspicuously incrassated; size smaller (length of the male about 5 mm.; diameter across the thorax about 1 mm.).....*valga* Harris

Tribe *Limnophilini*.

Genus *Limnophila* Macquart.

***Limnophila subaptera*, sp. n.**

Subapterous; wing of the male longer than the halter.

Male.—Length about 12 mm.; wing 2.5 mm.

Rostrum and palpi dark brown. Antennæ dark brown, apparently with only 15 segments; segments of the flagellum short-oval with stout, black bristles and a sparse, white pubescence. Head grayish with scattered yellowish bristles.

Thoracic dorsum grayish with three indistinct grayish brown stripes, the lateral pair running back on to the scutum; sides of the scutellum yellowish. Pleura gray, the dorso-pleural membranes brownish yellow. Halteres brown, paler basally. Legs long and slender; outer faces of the coxæ grayish except the fore coxæ which are pale yellow; femora pale at the extreme base, the remainder dark brown; tibiæ brownish yellow, the apices darker brown; tarsi brown. Wings subatrophied, long and narrow, longer than the halteres (fig. 8), pale basally, darker brown apically.

Abdomen long and slender, brownish gray, the segments narrowly and indistinctly margined with paler; hypopygium with golden-yellow hairs.

Holotype, ♂, South Fork of the Kaweah R., California, below 5,000 feet, July 25, 1915, (J. Chester Bradley).

Type in the collection of Cornell University.

Similar to *L. aspidoptera* Coquillett (New Mexico) and like this species having apparently but 15 antennal segments, the reduction being brought about by the fusion or very close approximation of the last two segments; the three basal antennal segments in *aspidoptera* are the more brightly coloured. The most obvious difference is in the elongate wings of the present species, these

being about one and one-half times the length of the halteres; in *aspidoptera* (fig. 9) the wings are short and broad, and extend to about two-thirds the length of the halteres.

***Limnophila (Prionolabis) cressoni*, sp. n.**

Dark brown with the thoracic stripes indistinct; wings with narrow, grayish brown seams to the cross-veins and deflections of veins.

Male.—Length 8 mm.; wing 10.6 mm.

Female.—Length 10 mm.; wing 10.8 mm.

Rostrum short, dark brown; palpi dark brown. Antennae short, dark brown; the flagellar segments very short, almost rounded, with an abundant white pubescence. Head gray.

Thoracic dorsum dark brown with a sparse, yellowish gray bloom, the præscutal stripes poorly defined. Pleura clearer gray, the dorsal-pleural membranes brownish. Halteres dull yellow, the knobs a little darker. Legs with the coxæ and trochanters dull brownish yellow, darkened toward their apices, this dark tip broadest on the fore and middle femora, narrowest on the hind femora; tibiæ brown, the tips narrowly dark brown; tarsi brown. Wings with a pale, brown suffusion; stigma dark brown; broad, grayish brown seams along the cord, the outer end of cell 1st M_2 and at the origin of the sector. Venation (fig. 7) R_{2+3} about as long as the basal deflection of Cu_1 .

Abdomen brown, the terminal segments darker. Hypopygium of the male with the ninth tergite having a broad, V-shaped median notch that is bordered with pale reddish brown; ventral pleural appendage with a few scattered teeth that are not prominent.

Female quite similar to the male, the ovipositor with elongate, acute, nearly straight tergal valves; sternal valves elongate, only a little shorter than the tergal pair.

Holotype, ♂, Lagunitas Canyon, Marin Co., California, March 29, 1908, (E. T. Cresson, Jr.).

Allotopotype, ♀.

The types are in the collection of the American Entomological Society, Philadelphia.

This fly differs from the only described regional member of

the subgenus (*L. barberi* Alex.) in its larger size and different coloration.

Tribe *Pediciini*.

Genus *Tricyphona* Zetterstedt.

***Tricyphona degenerata*, sp. n.**

Cell *1st M*₂ of the wings open by the atrophy of the outer deflection of vein *M*₃; wings small, somewhat degenerate, in the male less than 5 mm. in length.

Male.—Length about 4.8 mm.; wing 3.8 mm.

Head lacking in the type.

Pronotum light yellow. Mesonotum yellowish, the præscutum with a broad, dark brown, median stripe and shorter lateral stripes that continue back on to the anterior half of the scutal lobes; scutellum and the remainder of the scutum yellow; postnotum with a very sparse, grayish pruinosity. Halteres pale, the knobs a little darkened. Legs with the coxæ elongated, dull yellowish; trochanters yellow, the margin at the junction with the femora darkened; femora and tibiæ brownish yellow, the tips of the latter narrowly darkened; last two tarsal segments and the claws dark. Wings long and slender, small, degenerate, although with a complete venation; pale yellowish subhyaline, the veins yellowish brown; stigma indistinct. Venation (fig. 11) *Rs* angulated at its origin; cross-vein *r* about two-thirds the length of that portion of *R*₁ beyond it; petiole of cell *R*₄ longer than the *r-m* cross-vein; forks of *M* subacute; cell *1st M*₂ open by the atrophy of the outer deflection of *M*₃.

Abdomen dark brown, the hypopygium more reddish brown.

Holotype, ♂, Geneva Park, Grant, Colorado, altitude 9,500–10,000 feet, July 22, 1916, (E. C. Jackson).

The only other *Tricyphona* in the Nearctic fauna with the cell *1st M*₂ open by the atrophy of the outer deflection of vein *M*₃, is *T. aperta* Coq. (fig. 10), a full-winged fly that is much larger than our present species. A comparison of figures 10 and 11 will show the chief differences between the species. The condition in the present species is one of degeneration, the wing measuring but 3.8 mm.; the even more degenerate *T. hannai* Alex. (Pribilof Islands) represents the culmination of this tendency in the known species of the genus.

Genus *Rhaphidolabis* O. S.***Rhaphidolabis (Rhaphidolabis) sessilis*, sp. n.**

Size large (wing of the female over 8.5 mm.); body-coloration gray, the mesonotal præscutum with three dark brown stripes; wings with the cross-vein *r* at the tip of *R*₁; cell *R*₂ sessile or sub-sessile.

Female.—Length 6.8 mm.; wing 8.8 mm.

Rostrum and palpi dark brown. Antennæ brownish, the scape with a gray bloom; flagellar segments oval, dark brown. Head gray.

Mesonotum light gray, the præscutum with three dark brown stripes of which the median one is slightly darker and broader, becoming obsolete just before the transverse suture; lobes of the scutum brownish. Pleura gray, the dorsol-pleural membranes more brownish. Halteres pale, the knobs brown. Legs with the coxæ dull yellow, the outer faces with a gray bloom that is heaviest on the hind coxæ; remainder of the legs dark brown, the femora brightened basally. Wings with a pale gray suffusion, highly iridescent; stigma light brown; veins brown. Venation (fig. 12) *R*_s short, strongly arcuated; cross-vein *r* at the very tip of *R*₁; cell *R*₂ sessile or very short-petiolate.

Abdomen dark brown; valves of the ovipositor strongly reddish yellow.

Holotype, ♀, Hall Valley, Colorado, August 11, 1915, (E. J. Osler).

This fly is readily separated from all the described species (see the author's key to the Nearctic species of the genus, *Proceedings Academy Natural Sciences Philadelphia*, p. 541, 542, 1916), in its large size and the position of the radial cross-vein.

***Rhaphidolabis (Rhaphidolabis) major*, sp. n.**

Size large (wing of the female over 9 mm.); body-coloration pale brown, the præscutum with a broad, dark brown median stripe.

Female.—Length 7.8 mm.; wing 9.4 mm.

Rostrum yellowish brown, the palpi dark brown. Antennæ dark brown. Head brownish gray.

Pronotum light brown, darker brownish medially. Mesonotal

præscutum light fawn-brown with a very dark brown median stripe and much paler lateral vittæ; the conspicuous median stripe is broadest in front, gradually narrowed behind, ending before the transverse suture and narrowly bisected behind; lateral præscutal stripes and the lobes of the scutum paler brown; remainder of the scutum, the scutellum and postnotum reddish yellow, the latter browner on the caudal half. Pleura pale reddish brown, very sparsely dusted with whitish. Halteres yellow, the knobs brown. Legs with the coxæ dull yellow; trochanters similar, their margins blackened; femora dull yellow, the tips narrowly brown; tarsi dark brown. Wings yellowish gray subhyaline, strongly iridescent; stigma very pale; veins dark brown. Venation (fig. 13) R_s long, almost straight; cross-vein r removed from the tip of vein R_1 to a distance about equal to its own length; R_{2+3} shorter than the radial cross-vein.

Abdomen grayish brown with a reddish cast that is best defined on the caudal margins of the terminal sternites; ovipositor reddish yellow.

Holotype, ♀, Horseman Creek, Geneva Park, Grant, Colorado, altitude 10,200 feet, July 19, 1916, (L. O. Jackson).

This is the largest species of the genus.

EXPLANATION OF PLATE XII.

Fig. 1. *Chionea primitiva*, sp. n.; ♂, legs of the right side not figured; w = wing.

Fig. 2. *C. gracilis*, sp. n.; ♂, dorsal aspect, legs of the left side not figured.

Fig. 3. Antenna of *Pterochionea bradleyi* Alexander; ♂.

" 4. The same, *Chionea primitiva*; ♂.

" 5. Wing of *Erioptera noctivagans*, sp. n.; ♂.

" 6. " *E. cinereipleura*, sp. n.; ♂.

" 7. " *Limnophila cressoni*, sp. n.; ♀.

" 8. " *L. subaptera*, sp. n.; ♂.

" 9. " *L. aspidoptera* Coquillett; ♂.

" 10. " *Tricyphona aperta* Coquillett; ♂.

" 11. " *T. degenerata*, sp. n.; ♂.

" 12. " *Rhaphidolabis sessilis*, sp. n.; ♀.

" 13. " *R. major*, sp. n.; ♀.

SUNFLOWER INSECTS IN VIRGINIA AND CONNECTICUT

BY T. D. A. COCKERELL, BOULDER, COLO.

Last August I visited Mr. S. A. Rohwer, at Falls Church, Va., and with his assistance obtained a series of insects from the sunflowers (*Helianthus annuus* var. *zonatus*) growing in his garden. The list is as follows:

(A) Visiting the Flowers.

Lepidoptera: *Anosia plexippus* L., sucking.

Hymenoptera: *Melissodes dentiventris* Smith, both sexes; *Melissodes caliginose* Cress., ♀; *Apis mellifera* L., worker; *Bombus consimilis* Cress., worker; *B. americanorum* Fb., worker; *Halictus capitosus* Sm., ♀s.

(B) On Foliage.

Hymenoptera: (Determined by Dr. W. M. Wheeler, who was present at the time). *Formica pallidefulva* Latr. and var. *nitidiventris* Emery.

Hemiptera: (Determined by Mr. O. Heidemann). *Entylia concisa* Walk., breeding on leaves; *Ilnacora stalii* Reuter, breeding on leaves.

In addition, a species of aphid (*Macrosiphum*) was found, of which we can only say now that it differs from any recorded from *Helianthus*.

On Sept. 11, Dr. W. M. Wheeler very kindly collected insects on sunflowers (*Helianthus annuus* var. *macrocarpus*) at Colebrook, Conn., (alt. 1200 ft.), and sent me the specimens. The list is as follows:

Hymenoptera: *Myrmica scabrinodis* subsp. *schenki* var. *emeryana* Forel (Oct., Wheeler); *Bombus consimilis* Cress., six workers having the yellow pubescence brighter than in examples from Garrison, N.Y.; *B. fervidus* Fb., one male and six workers; *Melissodes dentiventris* Sm., ♀; *Megachile latimanus* Say, ♀.

Hemiptera: *Lygus pratensis* L., and a species not recognized.

Diptera: *Eristalis*, *Syrphus* and *Sphaerophoria*.

At Boulder, Colorado, in September, 1916, I observed numerous moths one evening visiting the red sunflowers. On collecting a number, I found they were nearly all *Feltia subgothica* Haw.

June, 1917

A COMPARISON OF THE ANTENNÆ OF THE GRYLLO-
BLATTIDÆ AND EMBIIDÆ TO DEMONSTRATE
THE RELATIONSHIP OF THESE TWO
GROUPS OF INSECTS.

BY G. C. CRAMPTON, PH. D.*, AMHERST, MASS.

It has been maintained that the Grylloblattidæ are descended from Blattid-like forms, by some investigators (Walker, 1914, and others), while the writer (Crampton, 1915-1916) would derive them from Plecoptera-like forebears, through Embiid-like ancestors. It is of the utmost importance to determine the exact affinities of the Grylloblattids, if we wish to trace the genealogy of the Orthopteroid groups (i. e., the Tettigonids, Gryllids, Locustids, etc.) since the Grylloblattids have departed the least of any living insects from the ancestral condition of the Orthoptera and their immediate relatives, and, therefore, furnish us with the most reliable evidence available for determining the affinities of Orthopteroid insects. On this account, I would present the evidence to be gained from comparative anatomy, in a series of papers in which the various external structures of the Embiids and Grylloblattids are compared part for part, in an endeavor to demonstrate that the Grylloblattids are more closely related to the Embiids than to any other group of lower Pterygotan insects, and that the Grylloblattids are consequently to be derived from Plecoptera-like ancestors through more immediate ancestors which closely resembled living Embiids.

In the present paper, which is the first of the series, I would present the evidence of close relationship between the two groups, to be gained from a comparison of their antennæ. Unfortunately, the accompanying rough sketches were made from loaned material, at a time when I did not realize the importance of making a more detailed study of the antennæ, since the specimens were borrowed primarily for the purpose of examining the thoracic sclerites—which furnish one of the most reliable sources of determining the relationships of insects, from the standpoint of comparative anatomy. The drawings, however, will be found sufficiently accurate for all practical purposes.

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.
June, 1917.

The close correspondence in the number of antennal segments occurring in a female *Grylloblatta* and a female *Embia* is most striking. In the female *Embia* which I was able to examine, through the generosity of Major Imms, twenty-seven antennal segments

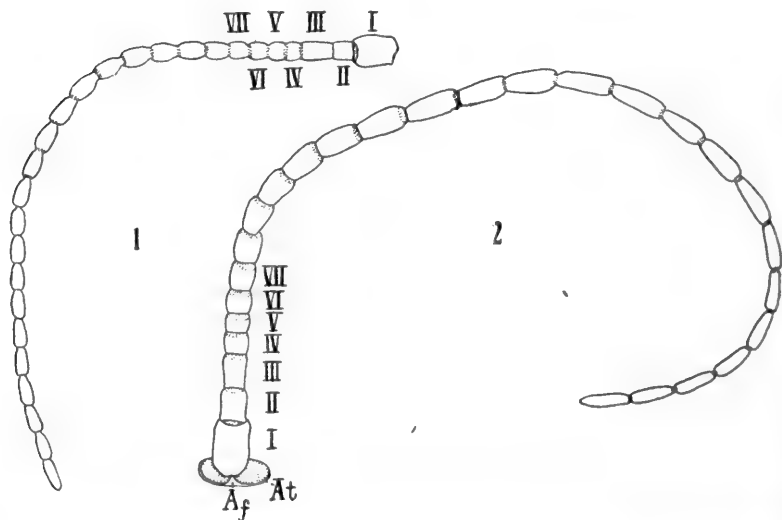


Fig. 9.—Lateral views of left antenna of (1) *Embia major* Imms, (2) *Grylloblatta campodeiformis* Walker.

occur (Fig. 9, 1), and in the female *Grylloblatta*, kindly loaned me by Dr. Walker, twenty-eight antennal segments occur (Fig. 9, 2). Imms, 1913, records a maximum of *twenty-nine* antennal segments for females of *Embia major* Imms; while Walker, 1914, records exactly the same number of segments (namely *twenty-nine*) as the maximum for females of *Grylloblatta campodeiformis*, Walk., thus showing an astonishingly close agreement in the number of antennal segments occurring in the two groups of insects. Indeed, there is a greater variation in the number of antennal segments among insects belonging to the same order, or even family, elsewhere in the lower Pterygota, and, coupled with other anatomical features no less striking, this clearly points to a remarkably close relationship between the Embiids and Grylloblattids.

In comparing the antennæ of the Grylloblattids with those of the typical Blattids (e. g., the antennæ of *Periplaneta americana* Linn) we find no such close correspondence in the number of segments, since the typical Blattid antenna is composed of considerably over a hundred more segments than are present in the antenna of *Grylloblatta*. Furthermore, the segments of a Blattid's antenna are of a very different type from those of a Grylloblattid's antenna, the smaller proximal antennal segments being more annular in outline in the Blattids. In the antennæ of the Embiids and Grylloblattids, on the other hand, there is not only a remarkable correspondence in the number of segments composing the antennæ, but the similarity extends even to the relative size and the outline of the antennal segments themselves.

In both *Embia* (Fig. 9, 1) and *Grylloblatta* (Fig. 9, 2) the scape (Seg. I) is much larger than the pedicel (Seg. II). Furthermore, the pedicel (Seg. II) is of about the same width as the postpedicel (Seg. III), but is shorter than the postpedicel (Seg. III) in both *Embia* (1) and *Grylloblatta* (2). In both insects, the postpedicel (Seg. III) is longer than the succeeding two segments. (Segs. IV and V) which are somewhat annular, or broader than long, in outline. The sixth segment (Seg. VI) is slightly longer than the two preceding it, in both *Embia* and *Grylloblatta*, while here is a slight increase in length in the seventh segment in both insects. The segments from this point on, gradually become longer, slenderer, and more cylindrical in both insects, and the correspondence, even to the minutest details, is so striking, that even the veriest tyro could not fail to perceive the remarkable similarity in the antennæ of these two insects. On the other hand, one has but to glance at the antennæ of a typical Blattid, to convince himself that the segments of its "whip-lash" antenna are of a very different type from those of *Grylloblatta*; and if any conclusions are to be drawn from a comparative study of the antennæ, they would clearly point to a remarkably close relationship between the Grylloblattids and Embiids, and a much more distant relationship to the Blattids.

It might be mentioned in passing, that the antennæ are situated nearer to the base of the mandibles, and below the eyes, in Embiids and Grylloblattids; while in the typical Blattids, the

antennæ are located higher up in the frontal region, between the eyes. The eyes of Embiids and Grylloblattids are similar in outline, and do not extend upward on the sides of the head; while in the typical Blattids, the eyes are more "reniform," and extend for a considerable distance upward along the sides of the head. The head is typically opisthognathous (i. e., mouthparts directed backward) in Blattids, while in both Embiids and Grylloblattids it is more prognathous (i. e., mouthparts directed forward). The cervical sclerites are astonishingly similar in Embiids and Grylloblattids (as will be brought out in a paper now ready for publication) while these neck plates in both groups differ markedly from those of the Blattids, and the same is true of the thoracic sclerites in general. The bodies of the Embiids and Grylloblattids are slender, while those of typical Blattids are broader and more flattened. It would be possible to cite many more instances of striking structural similarity between the Grylloblattids and Embiids, (in points wherein both differ markedly from the Blattids) but it is preferable to take up these structures point by point in a series of papers in which they can be discussed more in detail, and in which the points brought out can be illustrated by numerous figures—which after all are more convincing than bare statements of facts, since they enable one to form an opinion for one's self concerning the features in question.

The Grylloblattids are undoubtedly also very closely related to the Phasmids such as *Timema*, and in all probability both Phasmids and Grylloblattids were derived from forms quite similar to the Embiids. The Phasmodidæ (*Phasmodes ranatiformis*, Westw.) are insects very closely related to the Tettigonids ("Locustidæ") which have retained many features suggestive of Phasmid affinities, and beyond a doubt, a comparative study of *Phasmodes*, *Grylloblatta* and *Timema*, would be extremely instructive from the genealogical standpoint. It might also be mentioned that the Phylliidæ are too closely related to the Phasmids to be considered as a distinct order (the "Phyllioptera") as I formerly believed, since such Phasmids as *Ectatosoma* are quite closely related to the Phylliids (as can be seen by comparing the males of *Phyllium* with these Phasmids), so that I would now regard the Phylliids as a sub-order of the Phasmid group, rather than as a distinct order.

The insects most closely related to the Embiids are the Plecoptera, which are probably the nearest living representatives of the ancestral Pterygota, so that the Embiids were doubtless descended from Plecoptera-like ancestors. From these "Plecopteroid" ancestors the Forficulid line of development branched off in one direction, while that of the Embiids branched off in the other direction, and somewhere between the two (though doubtless nearer to the Embiid than to the Forficulid line) arose the Grylloblattid and Phasmid line of development. Somewhere between these in turn arose the Phasmodid, Tettigoniid and Gryllid lines of development, while the Phylliids branched off from the Phasmid line of development. From this, it may be seen that the Blattids are not near the direct line of descent of the Grylloblattids, Phasmodids, etc.; but this point will be more fully discussed elsewhere.

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1914. Walker. A New Species of Orthoptera, Forming a New Genus and Family; Canadian Entomologist, 46, p. 93.

Dr. Walker will shortly publish an article dealing with both sexes of *Grylloblatta*.

ABBREVIATIONS.

- Af. Antennifer, or process bearing the antenna.
- At. Antennale, or ring at base of antenna.
- I. First antennal segment, or scape.
- II. Second antennal segment, or pedicel.
- III. Third antennal segment, or postpedicel.
- IV. Fourth segment of antenna, etc.

TWO NEW SPECIES OF DICYPHUS FROM PORTO RICO, (MIRIDÆ, HETEROPTERA).

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

Specimens of the following new species have been received from Mr. R. T. Cotton, stationed at Rio Piedras, Porto Rico, where he finds them injurious to tobacco plants.

Dicyphus prasinus, n. sp.

Resembling *D. minimus* Uhl., but much larger and with greater width at the base of the head.

Head distinctly narrowed anteriorly, widest behind the eyes, with short, inconspicuous hairs. Eyes large. Front very convex and prominent. Clypeus prominent. First joint of antennæ stout and distinctly longer than the distance between the eyes, second joint as long as the head and pronotum together, third joint about equal to the second, and fourth joint equal to or slightly longer than the first. Rostrum extending to or beyond the hind coxæ. Pronotum wider than long, posterior lateral angles acute, posterior margin deeply emarginate, hairs or bristles on pronotum more prominent than those on head. Callosities of pronotum transverse, their posterior margin at the middle of the pronotum, median line impressed. Pronotum deeply concave or grooved at base of callosities. Colour: head, pronotum and scutellum pale yellow to yellowish green; eyes dark; clypeus and first antennal joint black; remainder of antennæ pale yellow to testaceous; a broad, dark lateral stripe on head behind eyes. Elytra subhyaline with small, fuscous spots, especially on the inner half. A large, irregular fuscous spot near costal margin of each wing-cover and midway between base and apex. Membrane more or less clouded and veins fuscous. Abdomen pale green, legs yellowish. Length to tip of hemelytra, ♀ $3\frac{1}{4}$ – $3\frac{1}{2}$ mm., ♂ 3 – $3\frac{1}{4}$ mm. Width of pronotum $\frac{3}{4}$ mm.

Described from three females and ten males, all of which are in the collection of the U. S. National Museum.

Dicyphus luridus, n. sp.

This species may readily be distinguished from others of the genus by its short head and lack of colour markings.

June, 1917

Head short, space between the eyes and the pronotal collar short, about equal to the width of the collar. Eyes large. Front very convex, clypeus prominent. Rostrum extending to hind coxæ. Basal joint of antennæ stout, short, slightly less than the width between the eyes, with few stout bristles, second joint only slightly longer than length of pronotum, third about as long as the second, fourth longer than the first. Collar of pronotum wide, callosities transverse with posterior margin at middle of pronotum. Posterior margin of pronotum nearly truncate, posterior angles rounded. Scutellum large. Elytra evenly clothed with fine, short hairs. Length to tip of elytra 3.5-4 mm. Width of pronotum 1 mm. General colour pale yellowish green, but varying from yellow to green, normally nearly unicolorous. Basal joint of antennæ yellow or testaceous at base and apex, making a dark band in the middle, apex of other segments pale, otherwise dark. Elytra subhyaline without distinct spots or colour markings, more or less smoky. Veins of membrane fuscous. Abdomen green, legs more or less spotted with fuscous.

Described from two females and seven males all of which are in the collection of the U. S. National Museum.

It is gratifying to learn that the Dominion Government has recently appointed Dr. C. Gordon Hewitt to be Consulting Zoologist, in addition to his duties as Chief of the Entomological Branch of the Department of Agriculture. The object of this new appointment is to enable him to advise the Government in all matters relating to the protection of birds and mammals, and dealing with any injurious kinds. It is not intended that this should in any way interfere with the performance of his valuable duties as Dominion Entomologist.

BOOK NOTICE.

Check List of the Lepidoptera of Boreal America, by Wm. Barnes, S. B., M. D. and J. McDunnough Ph. D., Decatur, Ill., 1917.

The publication of a new faunal check-list may well be likened to adding another milestone along the roadside of science, and

Lepidopterists looking over this latest list and then glancing backward at its excellent predecessor, Dr. J. B. Smith's List of 1903, may well be satisfied with the progress made.

In the matter of species, over 8,500 are now included against about 6,800 in Smith's List, an increase of 1,700 species or 25%, which in itself indicates much activity. But more important still has been the work of specialists in working out revisions of the various groups from a world-wide standpoint, which, while necessitating many changes, is bound to result in a more stable classification. Among the works referred to are those of Rothschild & Jordan on the Sphingidæ; Sir Geo. Hampson on the Arctiidæ and Noctuidæ; and of Mr. L. B. Prout on the Geometridæ, in addition to the revisions in the partially completed "Genera Insectorum" and "Macro-Lepidoptera of the World."

Embodied in the new list are not only the conclusions of these eminent authorities, but also the results of several years' study of the Barnes' collection and existing types in other North American collections, and finally changes had to be made to accord with the rules of nomenclature adopted by the International Congress.

The changes in many instances have been very drastic, but with the excellent index, which occupies almost as many pages as the list proper, little trouble will be experienced in finding the species looked for. As a compensation for having to forget a lot of names and learn new ones, it will give the older collectors a feeling of pleasure to find the "swallow-tails" are all *Papilio*s again, the "whites" are *Pieris*, instead of *Pontia*, and our friend the milk-weed butterfly is *archippus* again and its genus is *Danaus*, which sounds familiar even if the spelling be not.

The check-list is valuable to everyone interested in North American Lepidoptera, and the few lines headed "Exchange" on the fly-leaf at the back convey the good news that the same authors purpose publishing a full catalogue of North American Lepidoptera. It is hoped that the request for information will meet with a general and cheerful response.

The price of the Check-List is \$2.00, and copies are obtainable from Dr. Wm. Barnes, Decatur, Ill.

A. F. W.

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE DEATH-FEIGNING INSTINCT.

BY E. MELVILLE DUPORTE, MACDONALD COLLEGE, QUE.

Many widely different animals possess the instinct of feigning death. The sand-hopper, a terrestrial amphipod, and the pill-bug (*Armadillidium*) are well-known examples among the Crustacea. That many Myriapods will coil up and remain perfectly still on being touched is well known to all acquainted with the habits of the common millipedes. Among the spiders, the Epeiridæ or orb-weavers are perhaps the ones which most commonly feign death on being disturbed.

Though rare the instinct occurs among the vertebrate animals. Certain fishes and amphibians are known to feign death. Two noteworthy examples of death-feigning birds are the partridge of the pampas of the Rio de la Plata and the tern of Pekinese Island.

Among mammals one of the best known examples is that which has enriched the "American language" with the expressive term "playing possum." Other well known examples are the fox and the armadillo.

It is among insects, however, that the death-feigning instinct is most widely distributed, especially among the Coleoptera and Hemiptera. The active flyers such as the Diptera, Hymenoptera and Lepidoptera seldom feign death.

The term "feigning death"—an unfortunate one as it connotes a consciousness which does not exist—is used to designate the assumption by an animal, when disturbed, of a rigid state which may be of momentary duration or may last upwards of an hour. The attitude of the feigning animal varies, but is very seldom the same as the attitude of the dead insect. The motionless condition and the rigidity due to the contraction of the muscles are the chief characteristics of the death feint, and for this reason I have included under the term all rigid motionless attitudes which are the result of a reaction to a shock stimulus. Given so broad

an interpretation the death feint among insects falls into one or other of the three divisions which follow:

1. *The insect on receiving a shock becomes rigid without releasing its hold.*

Certain caterpillars will hold on to a twig by one or more pairs of prolegs, and elevate their bodies, assuming more or less grotesque rigid attitudes in which they will remain for a considerable time. Perhaps the best known examples are the caterpillars of the Sphinx Moths and of certain geometers. In these cases the insect seems to come to rest naturally in the immobile attitude, without the stimulus of a shock, the contraction of the muscles being probably due to an internal stimulus resulting from the active metabolism which takes place after the insect has eaten. If such is the case these reactions cannot properly be described as death feints. In other insects, however, a similar attitude can be definitely brought about by a shock. Thus if the yellow-necked apple-tree caterpillar (*Datana ministra*) be disturbed it will raise both ends of its body with a jerk, retaining hold of the twig by means of the four pairs of anterior prolegs.

2. *The insect when disturbed rolls itself into a motionless ball.* •

This habit seems to be common among terrestrial forms rather than among arboreal ones. The ruby wasps or cuckoo-flies (*Chrysididæ*) lay their eggs in the nests of wasps and bees. If attacked by their hosts the ruby wasps bend their abdomen beneath the thorax, and in this attitude resemble a small, metallic ball.

Sometimes the head and abdomen are bent back above the thorax. Thus Kirby and Spencer say of *Silpha thoracica* "when alarmed it turns its head and tail inwards until they are parallel with the trunk and abdomen and give its thorax a vertical direction, when it resembles a rough stone."

Certain of the rove beetles (*Staphylinidæ*) combine both attitudes, bending the head beneath the thorax and the abdomen above the elytra.

Many cutworms and other caterpillars also roll themselves into a motionless ball when disturbed.

3. *The insect releases its hold, contracts its legs and antennæ and falls to the ground, where it usually remains motionless and apparently dead.*

This is the condition to which the term "death feint" is usually applied, but it is difficult to draw a sharp line of demarcation between this and the reaction of the ruby wasps, between the attitude of ruby wasps and that of the carrion and rove beetles, or between the attitude of these beetles and the rigid attitude of the yellow-necked apple-tree caterpillar.

The death feint varies greatly in degree. On the one hand we have certain insects which when disturbed remain momentarily quiet, becoming active again almost immediately. On the other hand we have De Geer's classical example, *Anobium pertinax*. Kirby and Spence referring to this insect and in part quoting De Geer say: "All that has been related of the heroic constancy of American savages when taken and tortured by their enemies scarcely comes up to that which these little creatures exhibit. You may maim them, pull them limb from limb, roast them alive over a slow fire, but you will not gain your end; not a joint will they move nor show by the least symptoms that they suffer pain,"* and they naively continue: "do not think, however, that I ever tried these experiments upon them myself, or that I recommend you to do the same." In spite, however, of the admonition of the learned authors of the *Introduction of Entomology* several workers have repeated these experiments and found that the case of *Anobium* is an extreme one and that the majority of feigning insects gradate between this extreme and the other in which the loss of activity is but momentary. In *Tychius picirostris*, for example, the writer finds that while the legs and antennæ of the feigning insect may be cut off without eliciting any symptoms of activity, more drastic disturbances such as decapitation or severing the trunk always cause the insect to resume its activity. In the same insect it was found impossible to elicit the feigning response on a hot surface, and an insect in the death feint placed on a hot surface immediately became active and tried to escape. Cold, on the other hand, very greatly increased the duration of the feint.

*Compare Holmes on the feint of the Pekinese tern. "You may pull them about, stretch out their legs, neck or wings and place them in the most awkward positions, and they will remain as limp and motionless as if really dead. They will even suffer their wing and tail feathers to be plucked out one by one without a wince."

The duration of the feint may be momentary or it may exceed an hour. There is little uniformity either in individuals of the same species or in the same individual during successive feints. I have never found any gradational relation between the duration of successive feints, but Fabre found that in the beetle *Scarites gigas* the duration increased with each successive feint. With *Tychius picirostris* the longest feint may occur at any place in a succession of feints, but the average duration of the earlier feints is greater than that of those occurring later in the series. Turner had the same results with the ant-lion, and Gee and Lathrop the the Severins, and other workers have also failed to observe any definite relation in the duration of successive feints.

Most insects will feign again and again if stimulated. The number of successive feints is, however, limited. An insect after responding to a larger or smaller number of shocks will finally refuse to respond further. If allowed to rest, however, it will again respond.

In some cases—a well known example is the golden-rod chrysomelid *Trirhabda canadensis*—the insect may feign death on the near approach of the collector; in others the feint is not normally elicited until the insect is touched. Within the same species, however, the intensity of the shock seems to have no effect on the intensity or duration of the feint.

Both the collector and the economic entomologist have taken advantage of the death feint. One of the best known cases in which the economic entomologist enlists the aid of this instinct is the destruction of the plum curculio by jarring the trees. Scott and Fiske in an account of their work on the control of this pest in a Georgia peach and plum orchard give a list of other insects collected by jarring the trees for the curculio. This list includes two hundred and sixty-nine species of Coleoptera representing thirty-one families; seventy-one species of Hemiptera-Heteroptera representing eleven families; and eight species of Homoptera representing three families. Other orders were represented, but the numbers were so few that these insects were not listed.

The advantage of the death feigning instinct to its possessor is doubtful. When an animal resembles its surroundings in colour or form, the ability to remain perfectly still makes it practically

indistinguishable. Every collector or hunter knows the value of immobility in concealment. Certainly every collector has felt the impulse to give voice to some strongly emphatic expletive on losing a coveted specimen which on being approached drew its legs close to its body and dropped to the ground where it remained effectively hidden from his disappointed eyes. We should be careful, however, not to lay too much emphasis on the advantages of this action because it is hardly probable that the natural enemies of these insects are quite as readily outwitted as we are. Indeed the instinct may in some animals be not only useless but positively injurious. This is true of certain birds which, when pursued, instead of seeking safety in flight or shelter, feign death in the open where they may be easily captured.

There have been several explanations given of the nature of the death feint. Certainly there is no consciousness involved, and the instinct is merely a physico-chemical reaction to external stimulus. The most probable theory is that in the death feint we have an example of negative thigmotaxis, that shrinking from contact characteristic of so large a proportion of all classes of animals.

A NEW NORTH AMERICAN SPECIES OF THE GENUS TETRAMERINX (DIPTERA, ANTHOMYIIDÆ).

BY J. R. MALLOCH, URBANA, ILL.

The genus *Tetramerinx* belongs to the subfamily Cœnosiinæ of the Anthomyiidae, and may be distinguished from its allies by the presence of 4 post-sutural dorso-central bristles on the mesonotum. The females are readily distinguished from any allied genus except *Phyllogaster* by the peculiar clawlike processes on the apical abdominal segment.

Stein described the genus under the name *Tetrachæta*, but this name was preoccupied and subsequently was replaced by *Tetramerinx* by Berg.

KEY TO SPECIES.

1. Third antennal joint not over twice as long as
second (Ill.).....*brevicornis*, sp. n.

July, 1917

Third antennal joint at least four times as long as second.....2.

2. Hind femora of male with a comblike fasciculus of short, stiff bristles at base of ventral surface; abdomen in both sexes with a pair of large subtriangular black spots on dorsum of segments 2 to 4; veins 3 and 4 of wings convergent apically; antero-dorsal surface of hind tibia with 1 bristle in female (Cal.).....*femorata* Malloch

Hind femora of male without a fasciculus at base; abdomen in both sexes with a faint central line; veins 3 and 4 of wings subparallel; antero-dorsal surface of hind tibia with 3-4 bristles (Mass., Tex.).....*unica* Stein

***Tetramerinx brevicornis*, sp. n.**

Female.—Length 4 mm. Black, densely covered with yellowish gray pruinescence. Frons yellowish gray with the exception of an opaque, black, wedge-shaped mark on each side at apex of frontal triangle; antennæ and palpi black. Thorax unmarked. Abdomen with very faint indications of a pair of spots on dorsum of segments 2 and 3. Legs black. Calypteræ white, yellowish on margins. Halteres yellow. Wings clear, veins yellowish.

Frontal triangle very broad, obscuring central stripe on posterior half; each orbit as broad as central stripe, the bristles nearer inner than outer margin, a series of short setulæ laterad of the bristles; frons and face distinctly protuberant; third antennal joint about twice as long as second; arista swollen on basal fourth, very shortly pubescent; marginal bristles on cheek sparse; cheek one-fifth as high as eye, the latter nearly twice as high as long. Thorax very sparsely haired; acrostichals irregularly 2-rowed. Abdomen without strong bristles except at apex. Fore tibia with or without a weak bristle; mid tibia with 2 weak posterior bristles; hind tibia with 4-5 antero-dorsal and 2 antero-ventral weak bristles. Inner cross-vein distinctly beyond middle of discal cell; outer cross-vein almost straight; veins 3 and 4 subparallel apically.

Type locality, Waukegan, Ill., August 23, 1906. Taken on shore of Lake Michigan. Two specimens.

Type in collection of Illinois State Laboratory of Natural History.

THE ANTHOMYIID GENUS PHYLLOGASTER (DIPTERA).

BY J. R. MALLOCH, URBANA, ILL.

In the collection of the Illinois State Laboratory of Natural History I find two species of the genus *Phyllogaster*, one being the genotype and the other an undescribed species.

Nothing is known of the immature stages of the genus. The specimens before me were taken on or near the seashore or the banks of rivers. The genotype was described from specimens from Florida and Massachusetts.

The females of this genus may be separated from those of any other in Cœnosiinæ except *Tetramerinx* by the presence of four strong, clawlike thorns at apex of last abdominal segment. The former has but 3 pairs of post-sutural, dorso-central bristles while the latter has 4. Both sexes of *Phyllogaster* have the frons protruded beyond the anterior margin of eyes, the antennæ much elongated, and the arista bare and much swollen on the basal third.

DIAGNOSIS OF SPECIES.

Abdomen with an interrupted longitudinal median brown stripe and a pair of faint spots of same colour on segments 3 and 4; hind femora with 1 or 2 strong and several weak bristles on apical half of antero-ventral surface; hind tibiæ with 1 antero-ventral bristle; third vein of wing bare proximad of the inner cross-vein.....*cordyluroides*.

Abdomen usually with the central stripe faintly visible, the spots indistinguishable; hind femora with from 3 to 5 strong bristles on apical half of antero-ventral surface; hind tibiæ with 2 antero-ventral bristles; third vein usually with a few weak bristles proximad of the inner cross-vein.....*littoralis*.

***Phyllogaster cordyluroides* Stein.**

Berl. Ent. Zeitschr., 1897, p. 256.

I have before me two males which I consider belong to Stein's species. One specimen, from Florida, is very pale in colour, being
July, 1917

densely covered with whitish gray pruinescence. The abdominal markings are distinct though not so well defined as in the other example, from Padre Island, Texas, which is considerably darker and has the markings very conspicuous. The Florida specimen is not in very good condition, but the Texas one has the lateral plates of the apical, furcate ventral segment armed with numerous hairs amongst which there are several long bristles. The arista in both specimens is subequal in length to the third antennal joint. Length 3-4 mm.

***Phyllogaster littoralis*, sp. nov.**

Male and female.—Black, densely covered with whitish-gray pruinescence, which is slightly yellowish on dorsum of head and thorax. Antennæ and palpi black. Abdomen with very faintly indicated central dark stripe. Legs black, apices of femora and all of tibiæ reddish yellow. Wings clear, veins pale. Halteres yellow.

Orbital bristles moderately strong, 4-7 in number; arista pubescent, basal third much swollen, entire length about $1\frac{1}{3}$ that of third antennal joint; cheek from one-fourth to one-third the height of eye. Thorax with few setulæ; acrostichals irregularly 2-rowed. Abdomen with setulose hairs, third and fourth segments with a transverse series of bristles on middle which is stronger than the one at apex. Fore tibiæ without median bristle; mid tibiæ with 2 on posterior surface; hind tibiæ with 2-3 antero-dorsal, 2 antero-ventral, and 1 postero-dorsal. Third vein usually with a few weak, widely-placed bristles on under surface proximad of the inner cross-vein.

Length 3.5-5 mm.

Type locality, Grand Tower, Ill., July 12, 1909, on willow on bank of Mississippi River. Paratypes, Waukegan, Ill., August 23, 1906, on shore of Lake Michigan; Algonquin, Ill., July 10, 1895; South Haven, Michigan; July 14, 1914, on shore of Lake Michigan.

A NEW SPECIES OF SOMATOCHLORA (ODONATA) WITH NOTES ON THE *CINGULATA* GROUP.

BY CLARENCE HAMILTON KENNEDY,
CORNELL UNIVERSITY, ITHACA, N.Y.

While gathering material during the past year for a list of western dragonflies, the writer has had the privilege of examining these insects in nearly all the large collections of the United States. Particular attention was paid to the genus *Somatochlora* because of the meagre data heretofore published on these rare insects. Much difficulty was experienced in finding enough material in any one collection to make adequate comparisons of related species.

The writer wishes to thank Dr. Holland and Mr. Hugo Kahl, of the Carnegie Museum, for the privilege of using the specimen in the Carnegie Museum collection as a type.

Dr. Walker has promised to monograph this genus. It certainly needs thorough overhauling by someone who can assemble all the material for careful comparison. The identity of many of the females is a matter of conjecture.

***Somatochlora walkeri* n. sp.**

Holotype.—Male, collected on the Kuskokwin River, Alaska, by A. Stecker, and now in the Carnegie Museum of Pittsburgh, Pa.

Allotype.—Female, a broken specimen in the collection of the Museum of Comparative Zoology. It is a part of the Hagen collection and is labeled "Epith. septentrionalis ♀ Hag. Saskat. Scudder, F. C. Gray's Fund." Segments 4 and 5 are missing, which give it the small size of *septentrionalis*.

Near *hudsonica*, but colour very dark and appendages different. More remotely related to *septentrionalis*, *albicincta* and *cingulata*.

Length of abdomen, male (exclusive of appendages) 32 mm., length of appendages 3 m.; female with abdominal segments 4 and 5 missing, but the abdomen without appendages is probably about 34 mm. Length of hind wing, male, 33; female 29 mm.

Male.—Colour: labium yellow, labrum black, anteclypeus creamy, postclypeus black. Frons black with metallic greenish

reflections, a brownish creamy spot on each side. Vertex and occiput almost black, rear of head black. See Pl. XIII, fig. 9.

Prothorax hidden by the heavy, white pile on the rear of the head and on the mesothorax.

Mesothorax and metathorax metallic green with coppery reflections on the lower end of the mesepisternum and the infraepisterna. Coxæ and all legs black. A suggestion of creamy along the alar edge of the mesepisternum. An obscure, narrowly elliptical, yellow spot on the posterior edge of the mesepimeron above the metathoracic spiracle. Entire thorax covered with long, creamy pile. Wings hyaline. Pterostigmata pale brown.

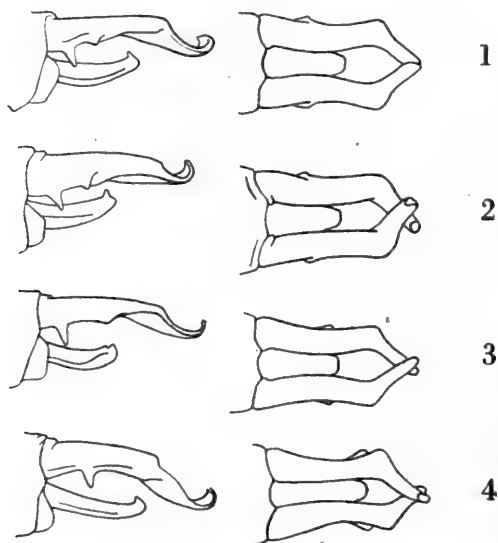


Fig. 10.—*Somatochlora septentrionalis*.

1. Appendages of male, Somer (Coll.), Labrador, M. C. Z.
2. Appendages of male, Grand Lake, Nfd., Williamson.
3. Appendages of male, Winther (Coll.), Labrador, M. C. Z.
4. Appendages of male, Hudson's Bay, Carnegie Mus.

Abdomen with segments 1-3 and 10 black with metallic green reflections, segments 4-9 pure black except the intersegmental membranes 2-3 and 9-10, and the triangular yellow spot on the lower anterior edge of segment 3.

Structure.—This is a short, heavy species. Occiput large, reaching half way to the vertex. Lateral keel on segments 4-8.

Genital lobes small. Appendages 2-2½ times as long as segment 10. See Pl. XIII, figs. 10, 11. Viewed from above, cylindrical, arching slightly entad, the flat tips, which are half the length of the cylindrical bases, bent sharply entad at almost 90 degrees, then curving caudad with their apices bent dorsad and cephalad. Viewed laterally the externo-inferior surface of the appendage is a longitudinal groove whose external edge has a blunt tooth at its extreme base and the inferior or ental edge has a similar basal tooth, *but this just caudad of the tooth on the external edge of the groove*. Viewed laterally the apical third or the flat tip *bends abruptly ventrad*, then curves caudad, dorsad and finally cephalad. Inferior appendage about half the length of the superiors. Viewed ventrally it is triangular with its base more than half as wide as the appendage is long.

Female.—Colour as in the male but the prothorax with the posterior lobe yellow. Anterior coxa yellow on the outer or posterior side. Femora of anterior and middle legs brown on their basal two-thirds. Front wings with a tinge of dusky in the subcostal space to the first cross-vein. Hind wings tinged along the costal edge to beyond the arculus, also the first three basal cells posterior to the median dusky. Pterostigmata brown.

Abdomen with a pale area on the side of segment 1 and three pale areas on the side of segment 2, the dorsal one of the three being circular and twice the diameter of either lower spot. A large, circular, basal spot on the side of segment 3. (Segments 4 and 5 missing.) Obscure, minute, lateral spots on segments 6 and 7. Articulatory membrane between segments 2 and 3 white, between segments 7-8, 8-9 and 9-10 pale.

Vulvar lamina scoop-shaped, reaching to the middle of segment 10. It is more heavily chitinized than in the type female of *hudsonica*. The sternum of segment 9 reaches barely to the middle of segment 10. Appendages lacking.

This species has been confused with *hudsonica*. Figs. 5-8 are from the types of *hudsonica* in the Mus. of Comp. Zool. Dr. Walker has this true *hudsonica*, collected by Mr. Whitehouse at Red Deer, Alberta.*

*F. C. Whitehouse, Odonata of the Red Deer District. Can. Ent., XLIX, p. 100, Mar., 1917.

De Selys' description (Bull. Acad. Belg. (2) XXI, p. 301) agrees with the M. C. Z. types of *hudsonica*. Martin's figure 28 (Cordulines, Coll. Selys page, 27) is not the true *hudsonica* but this species *walkeri*, which is probably figured from a specimen in the Selys' collection mislabeled *hudsonica*. *Walkeri* differs from *hudsonica* in the superior appendages being closer together; in lateral view, in that the tip is directed ventrad, while in *hudsonica* it is directed caudad. In *walkeri* the two basal teeth almost overlap in lateral view. In *hudsonica*, they are apart the width of either tooth.

In coloration *walkeri* is very dark, but in a large series of *semicircularis* (Kennedy, Proc. U. S. N. M., 46, p. 111,) and in a large series of *albicincta* in the Carnegie Museum there is much variation in colour.

This species has *hudsonica* as its nearest relative. For this reason I have associated with this male the female found in the M. C. Z. collection which is most like the type female of *hudsonica* but seems to be specifically distinct. The female differs from the the *hudsonica* female in darker coloration (as does the male) and in the shorter sternum of segment 9. The only other females with which these might be confused are those of the *forcipata* group, but in none of these does the vulvar lamina exceed segment 9 in length.

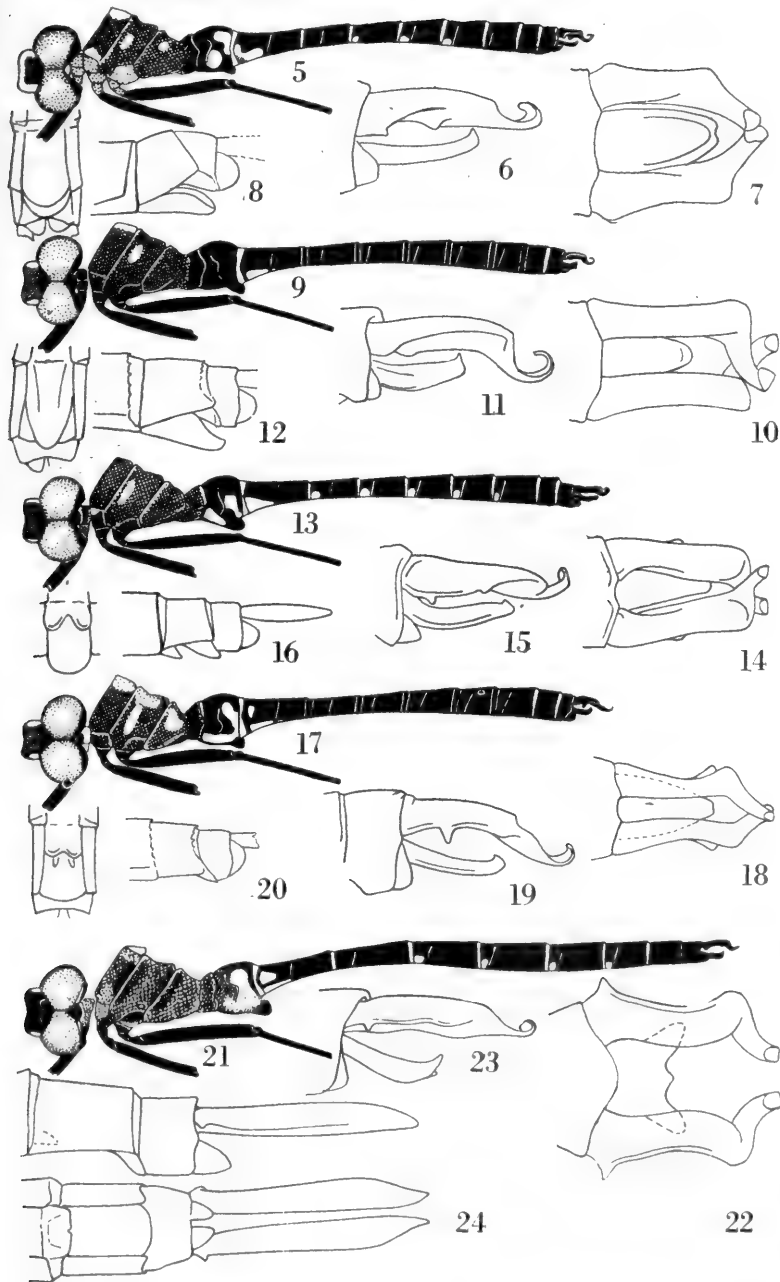
I take pleasure in naming this species for Dr. E. M. Walker, who has done so much work on our northern Odonate fauna.

***Somatochlora hudsonica* (Hagen).**

This species resembles *albicincta*, but is readily distinguished by the greater width between the bases of the superior appendages of the male. Until Mr. Whitehouse took this species at Red Deer, Alberta, last summer, the only specimens in this country were the types in the Museum of Comparative Zoology. The types are 2 ♂'s and ♀, from Ft. Resolution, Hudson Bay Ter., Kennicott, 1861. See figs. 5-8.

***Somatochlora albicincta* (Burmeister)**

Excepting possibly *semicircularis* this is the most common species in collections. The finest series is that in the Carnegie Museum from Mt. Ranier, Washington, collected by Jennings.



SOMATOCHLORA WALKERI, N.SP., AND ALLIES.

The less robust form which Scudder described as *eremita* appears in collections. The types of *eremita* are 3♂'s and ♀, Hermit Lake, New Hampshire, now in the collection of the Boston Society of Natural History. A ♂ and ♀ *eremita* are in Dr. Calvert's collection from the type locality. The writer has a male of this form collected by Dr. Walker at Banff. *Albicincta* and *eremita*

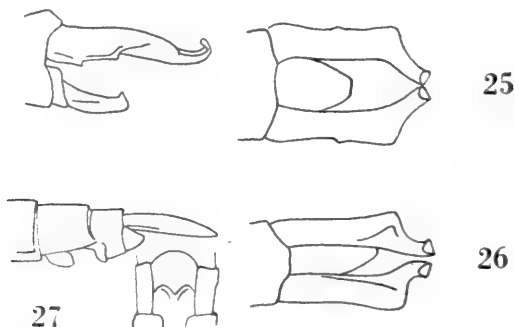


Fig. 11.—*Somatochlora albicincta*.

25. Appendages of male, type of "*eremita*" in Bost. Soc. of Nat. Hist., Hermit Lake, New Hampshire.
 26. Appendages of male in Dr. Calvert's Coll., Hermit Lake, New Hampshire.
 27. Segments 9 and 10 of female in Dr. Calvert's Coll., Hermit Lake, New Hampshire.

undoubtedly intergrade. Figs. 25-27 show specimens from Hermit Lake, fig. 25 being from the type. The male from Banff resembles fig. 26. See also figs. 13-16. The types themselves are nearer to the typical *albicincta* than the Banff or Dr. Calvert's specimens.

***Somatochlora septentrionalis* (Hagen).**

This is the smallest species in the genus, the abdomen being but 31 mm. in length.

A male of this from Hudson's Bay was found in the Carnegie Museum. It was so different from the specimen figured by Williamson (Ent. News, XVII, p. 138, as *hudsonica*) that it was considered new until the two male types in the Museum of Comparative Zoology were examined, when it was found that these type males were intermediate between the Williamson male and this Carnegie-Museum male.

Text fig. 10, 1-8 show the variation in the appendages of the four known males of this rare species.

This is evidently a very northern species as the known specimens are from Newfoundland, Labrador and Hudson's Bay. The vulvar lamina of the type female in the M. C. Z. is similar to that of the *albicincta* female but not as deeply notched, being less than a third the length of the lamina. The female can be distinguished by her very small size, for the abdomen of this type is but 30 mm. in length.

The following specimens are in American collections. ♂, Grand Lake, Newfoundland; ♀, Bay of Islands, Newfoundland, in collection of Williamson; ♂, Stag Island, Rupert Bay, Hudson's Bay, in Carnegie Museum; ♂, type, Labrador; ♂, Labrador; ♀, type, Labrador, in the Museum of Comparative Zoology. See also figs. 17-20.

***Somatochlora cingulata* (Selys).**

This is the largest and finest of all the American *Somatochlores*. It is interesting in that in her great robustness the female develops tubercles at the base of her appendages similar in position to those on the male. What is probably a similar assumption of male characters by robust females occurs in another species of *Somatochlora* not in this *cingulata* group. In a letter to Dr. Walker I suggested it might be due to a great abundance of food, while Dr. Walker had data that would indicate it to be due to climatic differences.

Besides a male, and I think a female, in the M. C. Z. collection, whose labels I neglected to copy, the following specimens occur in the collections I have had the privilege of studying. ♂, Bay of Islands, Newfoundland, and ♀, Grand Lake, Newfoundland, in Mr. Williamson's collection. ♂ and ♀, St. Ignace Isl., Lake Superior, and a ♀, from Orient Bay, Lake Nipigon, Ontario, in the Carnegie Museum. See figs. 21-24.

EXPLANATION OF PLATE XIII.

Figs. 5-8. *Somatochlora hudsonica*, male and female types, M. C. Z. Ft. Resolution, Mackenzie, Kennicott, 1861.

Figs. 9-12. *Somatochlora walkeri*, male type, Carnegie Mus., Kuskokwin Riv., Alaska; female type, Saskat., in M. C. Z.

Figs. 13-16. *Somatochlora albicincta*, male and female, coll. Williamson; male, Bay of Islands, Nfd.; female, Kadiak Isl., Alaska.

Figs. 17-20. *Somatochlora septentrionalis*, male, Carnegie Mus., Stag Isl., Rupert Bay (Hudson's Bay); female type, Winthem (Coll.), Labrador, in M. C. Z.

Figs. 21-24. *Somatochlora cingulata*, male and female, Carnegie Mus., St. Ignace Isl., Lake Superior. In copula.

ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.—II.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

During the winter and early spring months of 1916-'17 a number of interesting species of Coleoptera were taken in the vicinity of Dunedin, Florida, some of them on Hog Island, others about the lakes and hammocks north and east of the town. Some of these species are evidently undescribed; others are worthy of note on account of their having been hitherto taken at only one or two localities in Florida. Among the undescribed forms taken during the winter is a Staphylinid secured while on a visit to Gainesville. While not found near the coast it is included among the others noted in this second paper bearing the above title.

Biocrypta magnolia, sp. nov.

Elongate, subfusiform, feebly convex. Dark reddish or chestnut-brown, the antennæ and legs paler. Head subquadrate, as wide as elytra, strongly narrowed in front of eyes, vertex coarsely and sparsely punctate; basal joint of antennæ as long as the next four united, third slightly longer than second, which is equal to fourth. Thorax one-third longer than wide, apex as wide as base, sides almost parallel, angles rounded; disc highly polished and with an irregular row of rather coarse punctures each side of middle, and numerous scattered ones between these and the margins. Elytra as long as and slightly wider than thorax, about one-fourth longer than wide, sides parallel, disc coarsely, closely, shallowly and somewhat rugosely punctate. Abdomen but slightly

July, 1917

narrower than elytra, minutely and sparsely punctate, its surface as well as that of head and elytra sparsely clothed with very fine, prostrate hairs; under surface finely and sparsely punctate, the punctures bearing coarse, semi-erect hairs. Male with sixth or last ventral deeply and acutely notched, the third more or less prolonged backward in a lobe. Female with sixth ventral unmodified, the third with an obtuse perforated tubercle near its front margin. Length 7-7.5 mm.

Described from six males and one female taken February 7 beneath the loose bark of a large magnolia log on the grounds of the State University at Gainesville, Fla. Three of the males have the lobe of third ventral but feebly developed, while in the others it is prolonged backward beyond the middle of fifth segment. The genus *Biocrypta*, founded by Casey* upon LeConte's *Cryptobium prospiciens*, differs from its nearest allies in the absence of a pleural fold near the side margin of elytra, in the head being distinctly narrowed in front and by the males having the sixth ventral notched at apex, the third at the same time being lobed as described above. *B. prospiciens* Lec., which occurs in Texas and Arizona, is the only other known North American species of the genus. From it *B. magnolia* differs in colour and in its wider head and smaller eyes, as well as in the different form and coarser sculpture of its thorax.

Medonella minuta Casey.

Three specimens of this pretty little Pæderid were taken December 22 from beneath logs and chunks partly buried in the sand, just above the reach of high tide along the beach of the bay at Dunedin. It was described from Biscayne Bay, and is not recorded elsewhere.

Zagloba bicolor Casey

A dozen specimens of this bristly little Coccinellid were swept January 29, from the low sea-blite, *Batis maritima* L., which grows in partially overflowed tracts on Hog Island, opposite Dunedin. The beetle was described from Palm Beach, Fla., in 1899,** and has not since been recorded.

*Trans. Acad. Sci. St. Louis, XV, 1905, 23.

**Journ. N. Y. Entom. Soc., VII, 114.

***Ischyrys tripunctatus*, sp. nov.**

Form and size of the well-known *I. 4-punctatus* Oliv., from which it differs in sculpture and colour as follows: Head much more coarsely punctate and with a reddish-yellow spot each side between the eyes; thorax less coarsely punctate than head, but more so than in *4-punctatus* and with three instead of four round, black spots, the median one twice the size of the lateral ones, the latter more distant from the margin than in *4-punctatus*. Elytra more distinctly alutaceous and with fine, scattered punctures along the intervals; the common scutellar black spot larger and more evenly quadrate, separated by a narrow, yellow cross-bar from a black space which extends three-fourths to apex and which is partially broken by a yellow line extending backward to apical third along the fifth interval; apex yellow, the oblong, black, sub-apical spots of *4-punctatus* lacking. Length 7 mm.

Described from a single specimen taken near Dunedin, February 8, from between the leaves of a large air plant, *Tillandsia utriculata* L.

***Soronia brunnescens*, sp. nov.**

Elongate-oval, feebly convex. Uniform pale reddish-brown, the legs but slightly paler. Head finely and sparsely punctate, broadly impressed between the eyes, which are prominent and coarsely granulated; antennal grooves almost straight. Thorax two-thirds wider than long, apex broadly and shallowly emarginate; sides broadly and regularly curved, the hind angles obtuse; disc very finely, sparsely and evenly punctate, the margins moderately explanate and feebly recurved. Elytra slightly wider at base than thorax at middle, their margins more widely explanate, sides broadly curved from base to the rounded apex; disc glabrous, without trace of costæ, punctate like the thorax. Abdomen minutely pubescent, finely and densely punctate. Length 3.5 mm.

Described from three specimens taken at porch light at Dunedin, June 10. From the other members of the genus, which are easily known by the presence of a frontal lobe which projects over the basal joints of the antennæ, *brunnescens* is distinguished by its uniform pale colour, smaller size and lack of elytral costæ.

Arhipis lanieri Guer.

A single dead specimen of this rare Elaterid was taken in a fungus beneath the bark of a dead water-oak on December 1st. Its first and probably the only other record from the United States was by Schwarz*, who found a large colony of the adults in the branch of an undetermined tree at Cocoanut Grove, Florida. He has also beaten it from branches at Cayamas, Cuba.

Chrysobothris chrysoela Ill.

This very handsome little Buprestid is mentioned by Schwarz as being "very rare" at Haulover, Enterprise and Lake Ashby, Fla. A half dozen or more specimens have been taken near Dunedin by beating the wax myrtle, *Myrica cerifera* L., in November and March. It has also been taken by me at Ft. Myers, Sanibel Island and Lake Istokpoga, and is probably more widely distributed than the records would indicate.

Melanophila notata Lap. & Gor.

Single examples of this rather rare species were taken at Dunedin and Ormond on June 5 and April 6, on the former date at light. It is recorded from Georgia and Florida, and a specimen was taken in an Indianapolis street car on June 22—perhaps an involuntary import by some passenger.

Hypotrachia spissipes Lec.

A single example at porch light on June 5. This species was described from Florida by LeConte in 1862,** but I can find no further mention of it in any Florida list, Schwarz giving only the name as recorded from Florida, but the species not collected by him.

Polyphylla gracilis Horn.

Three specimens have been beaten from young pine trees near Dunedin, between March 27 and April 10. It was described from "near Jacksonville, Fla."

Chlorophorus annularis Fab.

A single example of this East Indian species, known hitherto from India, Java, Borneo and Sumatra, was taken at porch light at my residence in Dunedin by my son on June 10, 1915. It was determined for me by A. J. Mutchler of the American Museum of Natural History, and was shown by him at the meeting of the New York Entomological Society on November 21, 1916.

*Proc. Ent. Soc. Wash., Vol. 2, p. 39.

**Smithsonian Misc. Coll., III, 137.

***Neoclytus simplarius*, sp. nov.**

Elongate, slender, subcylindrical. Pale reddish brown, the apical third or more of elytra fuscous-brown; elytra each with a narrow, oblique bar of white pubescence at basal fourth, and a similar but wider bar of longer white hairs at apical third, both of these bars extending over to the sides of the under surface. Head coarsely, densely, rugosely punctate. Thorax subcylindrical, nearly twice as long as wide, its sides just visibly curved from apex to basal third, then suddenly strongly narrowed into the neck-like base; disc rather finely, very densely rugosely punctate, the median line with five very small, transverse tubercles. Elytra at base slightly wider than middle of thorax, then feebly narrowed and subparallel almost to apex, the tips separately obtusely angulate; disc minutely, evenly and very densely granulate-punctate, the granules covered with a very fine, velvety pubescence. Middle and hind femora armed at apex with two minute flat spurs. Length 4-8 mm.

Described from two specimens, beaten from *Ampelopsis arborea* L. at Dunedin, March 29—April 3, and two cotypes in the collection of Chas. W. Leng, taken at Enterprise, Florida, on November 10, from *Quercus nigra*. The transverse ridges or tubercles of the median line of thorax in the Dunedin types are so small as to be easily overlooked, and the species, therefore, taken for a *Clytanthus*, but in one of the Enterprise specimens they are larger and there are two additional tubercles on each side. The species resembles *Clytanthus albofasciatus* Lap. closely in form, size and general colour, but differs widely in the shape and sculpture of thorax and in the arrangement of the pubescent pale bars of elytra.

(To be continued.)

THE INSECT COLLECTIONS OF CANADA.

COLLECTION OF MACRO-LEPIDOPTERA, OWNED BY
F. H. WOLLEY DOD, MIDNAPORE, ALTA.

BY F. H. WOLLEY DOD.

The collection consists of about twenty-five to thirty thousand specimens. Of these, about three or four thousand are British, with a few other European and some Asiatic examples. These, with

very few exceptions, are kept together in one cabinet. The bulk of the British collection was formed during the owner's schoolboy days, over twenty years ago. Special attention has always been given to the Lepidoptera of Alberta, and allied species have been acquired from time to time from other parts of the continent in order to get a better understanding of local forms. But a chief specialty has now long been made of the Noctuidæ of North America, which comprise by far the greater portion of the collection. Very many of these have been obtained by purchase or exchange.

The room in which the collection is kept is comparatively large and very well lighted. The presence of a good light is most desirable for making critical studies, the absence of it giving rise to false conceptions. The collection itself is contained partly in cabinets, and partly in wooden store boxes. The drawers of the largest cabinets measure about eighteen inches wide, and about twenty-four from front to back. Such a large size has many advantages, especially for long series, but has been found rather unwieldy and awkward in practice. About seventeen or eighteen inches square seems more generally serviceable. About half the boxes are twelve inches by twenty, and double-sided; that is, each box contains usable space of twenty-three by nearly nineteen inches. These have considerable advantages over large cabinet drawers by reason of their lightness, though flat drawers, if not too heavy are actually safer. The smallest boxes are ten inches square and single-sided.

The paper, or occasionally the bare cork, as well as the sides of the cases, are first covered with a paint consisting of oxide of zinc and gelatine, applied hot. This, besides being an excellent way of renovating a stained or dirty box, increases the whiteness of even the best new paper, and greatly improves the light.

The greater part of the Noctuidæ were recently re-arranged, Sir George Hampson's generic names being used, with occasional slight alterations in the sequence for greater convenience and economy of box room. But the order of species in many of the genera is more in accordance with the owner's own conception of relationship. Hampson's specific names have also been used, with certain changes deemed necessary. The specimens are in double rows, males being placed on the left of a column, and females on

the right, whenever the sexes are fairly well divided or where economy of space is not important. But when one sex largely predominates, especially in long series, or where space is scarce, supers of the long sex are pinned to the inside of the centre of the wrong row. For instance, in a series of twenty-five males and six females, about five of the males might be pinned just sufficiently to the left of the centre of the female row to attract attention to the fact that they were not females. This still leaves room for the subsequent insertion of a few of either sex without lengthening the column. It has been usual to arrange a species in groups by localities, the sex arrangement being adhered to. In the case of a long series from one locality, some scheme of more or less continuous variation is often followed, say from light to dark, those of opposite sexes which most closely resemble one another being kept side by side. It may be observed that such an arrangement leaves frequent blanks in one or other of the rows, giving a very asymmetrical appearance, and in fact is not a paragon of neatness. But the collection is intended essentially for study, and though neatness is aimed at in most departures, utility and instructiveness are primarily considered. Some of the smallest species are arranged three or four rows in a column instead of two. In some of the cabinets the columns are divided by narrow strips of red paper pinned on, but others, and all the boxes, are merely ruled in ordinary lead pencil. Throughout the Noctuidæ spaces have been left for all known species, and every space has a name label. The size of the spaces varies according to the probability of acquisition in the near future, and also, unfortunately, in some genera especially, to the space available, and the length of the series already possessed. The size of spaces left for extension of series is regulated for the most part by the degree of variation. Though some cases have far more blanks than specimens, as a matter of fact the collection as a whole is much more crowded than was at first intended, and there is occasionally little or no room for extension. The columns also are too close together. All cases are, of course, kept well supplied with naphthaline.

As very close attention is paid to variation, long series of the more variable species are kept, there being in one or two instances as many as two hundred and fifty, and that number is considered far

from adequate. The species name is placed at the bottom of each column as well as at the end of the series or of the space left for extension. Each label has the name in brackets except the last of these. Reference has sometimes to be given to a continuation of a series in some extra box not in the sequence. Series consist of specimens picked to show the variation as much as possible. It has always been the custom, at the end of a season's collecting, to carefully examine all the new material in each species taken, and to pick out examples showing modifications not yet in the series, and relax, set and install them. Owing to lack of time in the summer very few things are set fresh. Unfortunately there are as yet very few early stages represented. Each drawer or box has an outside label on the front, on which they are numbered consecutively, with the names of all the genera contained therein, and when a genus is not all in one case, with some indication of the included species or group. Extreme accuracy of data is attempted.

The locality of personally or locally collected specimens is, as a rule, indicated by means of two labels on the transfixing pin. The uppermost of these gives the general locality and province, exact date when possible, and collector's name, though it has been a general custom to put the owner's name to all material collected by one or two constant assistants in the immediate district. This practice was to save extra trouble, but is not strictly in accordance with principles. A smaller label beneath this gives the more exact locality. Method of capture is occasionally indicated. Bred specimens are so marked, with "ex larva" or other stage, and food plant. Pairs taken *in copula* bear identifying labels. Specimens acquired from outside sources were formerly marked with collector's name and from whom received, and date of receipt. Latterly all such material has been given a small label bearing the year of acquisition, and a number, corresponding to similar numbers in an "Acquisition" book, in which full details of the receipt are noted. For instance, "13-16" on a small, separate label beneath the locality label refers to a note in the book under the year 1913, and Acquisition No. 16. This note gives details of the transaction, whether purchased, exchanged, donated, etc., date of receipt, number and class of specimens,

from whom received, general condition, and other details worth recording. The first lot received in the following year bear reference label "14-1." This system is in use in many museums, notably at Washington and in British Museum, and has many advantages to commend it.

The collection contains very few actual types, probably not more than a dozen, and fewer than a hundred co-types. But the next in value to types, and frequently, be it said, of far greater value than co-types, are specimens personally compared with types, co-types, with other important specimens, and with figures and descriptions. These specimens all bear extra explanatory labels, such as "Xd male type* at Rutger's College," with brief indication as to its concise points of difference, or "= *beta* female type at Brooklyn, exactly," or "*Alpha delta*, agrees with fig. of type," etc., etc. Specimens submitted to experts are similarly labeled, (in red ink) with reference to filed correspondence in corroboration. Specimens of which figures have been published are also marked. Some specimens have been compared with two or more types, and synonymic references thereby made or confirmed.

In addition to the above "authenticity" pin-labels, small card labels are placed at the side of these specimens so that they may be found quickly. These are more brief, and the most important ones are on tinted card, to catch the eye. For instance, a small, red-tinted label beside a specimen in the series of *Euxoa catenula* Grt., "Xd type, and *contagionis* Smith Xd type," would indicate the one by comparison of which with both types the reference of *contagionis* to *catenula* had been made. Varieties are not often separated or indicated as such, but merely by a similar side label bearing the name under which the form was described, whether actually compared or not; e. g., under *Monima hibisci* (*Taniocampa alia* of our lists) would be a large species name-label, "*hibisci* Gn.," at the foot of each column, and each one bracketed except the last. At the side of one specimen might be a small label "*quinquefasciata* Sm.," which is considered a variation. In this particular case an "Xd type" or "Xd description" specimen is probably referred to, though a specimen thus indicated

*The author uses a private symbol ♂, enclosed in a circle, to indicate male type, and ♀, enclosed in a circle, for female type.

does not always bear an authenticity label. Against another might be "*latirena* Dod" indicating one of a geographical race, and another "*malora* Smith." The status of such names, and of others, as decided upon by the owner, is explained in note-books and a card index. A brief note is sometimes placed at the bottom of a series, perhaps referring for comparison to some other species and box. Points for future investigation are thus kept in mind.

By no means the least valuable accessory to the collection is a series of MSS books containing critical notes. All those concerning North American species are indexed in a Smith's 1903 Check List, species described since its publication being entered at intervals. That was the system primarily adopted, and still adhered to, though the notes are now also indexed on a card index referred to below. They consist largely of records of impressions gained from inspection and studies of sundry other collections, and include notes on all types seen, as well as details concerning comparisons made with them, and any other facts about collections or specimens examined deemed worthy of note. There are a large number of entries concerning careful comparisons of Hampson's published figures with the types or other specimens from which they were taken, detailing any discrepancies in reproduction. A considerable quantity of discovered synonymy, and corrections of errors in identification by other authors are therein noted, which have not yet been published. Nearly all except the earliest notes bear dates of origin, and the same applies to those on the pin-labels. Needless to say, of several notes taken of the same type on different occasions, where inconsistencies appear, those of the later dates carry most weight, being the result of a closer acquaintance and better knowledge. These MSS books are primarily for the author's own guidance and instruction, and, it must be confessed, are scarcely a model of calligraphy.

Another very useful accessory is a Card Index, containing between four and five thousand cards, dealing almost exclusively with Noctuidæ. A card is allowed for each specific or varietal name ever published of North American species included in Hampson's catalogue from vols. IV to XIII. On the cards are entered:

The name and its author, at the top.

Reference to original description and date.

Reference to the more important publications such as Hampson's and Smith's catalogues, monographs, and to figures, stating in each cases the genus to which the name has been variously referred, and dates of the publications.

Important synonymic references.

At the bottom of the card, if the name stands as the prior one for a species, all the later names are given, with authors and dates, numbered in order of priority, those that stand for recognizable variations being so indicated. Or, if a synonym or variety, the first name only of the species is referred to, e. g., "*=alpha* Sm., 1891" or "*=var. of alpha* Sm., 1891," the authority for such references being elsewhere given on the card. Since, as before mentioned, each synonym or variety has a card to itself, a few species have twenty or more cards. A certain European Tortrix would require nearly seventy, allowing only one for each name. When space fails, another card has to be added, and the fact indicated at the top of each. At the top corners of the card are given:

Reference to the page in note-books where the form is dealt with.

Reference to the number of the slide on which genitalia have been mounted.

Reference, when thought desirable, to the drawer or box containing the species in the collection.

On the reverse side of the card is given the sex, locality and present location of each known type and co-type, together with the number, sexes, and localities mentioned in the original description.

A great deal of time has been spent in preparing this index, which has obviated more congenial work, but it has proved to be of the highest value and utility, as entire knowledge of literature and personal study of any name can be discovered in a moment, with little trusted to memory alone.

There is also a full MSS list of the N. American Noctuidæ, in Hampson's order and names, but revised to correspond with the arrangement in the collection. The recent synonymy only is given, original or otherwise, and all names which are considered to refer to recognizable varieties are entered as such. This list is

marked off according to box numbers, so that immediate reference can easily be made directly to any series.

A beginning has been made of the study of genitalia, and about six or eight hundred most excellent mounts have so far been prepared by Mr. W. H. T. Tams. Where material and time have permitted, several mounts of a species have usually been prepared from one locality, and where variation has been noticed or suspected, more have been made from different localities. As many as four are sometimes put upon one slide, and each mount is numbered to correspond with one on the specimen from which it was taken. These bear the usual data, and are carefully preserved, being in many cases installed in the general collection, and their position indicated by a special symbol at the side. The slides are numbered consecutively, and a catalogue is kept of them, in which brief, critical notes are entered. This study entails the sacrifice of the abdomens of the specimens. Poor, if recognizable, specimens have been used by preference, but when such details of comparison were thought to be of extreme value, good specimens have often been used, even of rare species. It is confidently believed that the partial spoiling of a certain number of specimens is a means fully justified by the end in view, which is the ultimate better understanding of a department of entomological study about which, whilst much has been written and suggested, a very great deal yet remains to be discovered. So far as the author has at present investigated, much valuable evidence, sometimes quite unexpected, has been acquired. And though it is by no means proposed to accept all previously published notes and figures made by others on the subject as unimpeachable evidence in favour of claims made therefor, certain facts brought to light speak for themselves in such a way as to remove all doubt which may have existed as to the extreme value of the study, if carefully and intelligently followed, as an aid to the elucidation of various obscure problems of relationship.

Perhaps the most regrettable want in connection with the collection is a good library. This contains very few publications of an earlier date than 1890, and scarcely any European literature, none of the earlier authors.

The author takes great pleasure in naming North American Noctuidæ and preparing critical notes for other students, and exchanging views. The work is found to be self-instructive, as well as useful to others. All material received is studied very closely, and anything doubtful compared with series and notes. The Card Index is resorted to in this connection. Everything is always returned unless special leave is given for retention. There are a large number of duplicates for distribution, consisting for the most part of Noctuidæ, principally unset. All Macro-Lepidoptera from Alberta or vicinity are desirable, and Noctuidæ (only) of N. America or Europe, and some Asiatic. When at home the owner derives great pleasure from showing the collection to any entomological visitors who are genuinely interested.

RECORDS OF EUROPEAN MIRIDÆ OCCURRING IN NORTH AMERICA. (HEMIPTERA, MIRIDÆ).

BY HARRY H. KNIGHT, ITHACA, NEW YORK.*

The writer desires to submit some definite data on the occurrence of certain species of Miridæ common to Europe and now known from North America. There are here recorded three species new to our fauna, and definite records are given of three others which are of particular interest. In conclusion the writer gives his findings on certain species supposed to occur and that apparently do not.

Subfamily PHYLINÆ. Tribe PHYLINI.

Microsynamma bohemani Fallen.

16 ♂ ♀, June 27, 1916, Honeoye Falls, N. Y. (H. H. Knight). ♀, June 22, 1914, Rochester Junction, N. Y.; ♂ 2 ♀'s, June 26, 1915, Honeoye Falls, N. Y. (M. D. Leonard). ♀, July 27, 1913, Callicoon, N. Y. (Wm. T. Davis). ♂, Aug. 9, Spruce Brook, Newfoundland, (Chas. Schaeffer). 7 ♂ ♀, Fort Collins, Colorado, (U. S. National Museum).

This species is apparently well distributed in the Eastern United States, having been reported before, but rather indefinitely. Mr. Van Duzee has failed to recognize it in his recent check-list of the Hemiptera, and previously in his tables to the genera of Miridæ. The writer has compared our specimens of this species

*Contribution from the Department of Entomology of Cornell University. July, 1917

with European forms of *bohemani* determined by Reuter, and finds them to be identical. At Honeoye Falls, N. Y., the species was found breeding on ornamental willows, growing in a commercial nursery. Doubtless the insect was in this case imported from Europe in the egg stage on the nursery stock. One specimen from Colorado has the hemelytra entirely pale, but the form of the insect is distinctive.

Subfamily ORTHOTYLINÆ. Tribe HALTICINI.

Orthocephalus mutabilis Fallen.

Specimens of this species were taken by Mr. C. W. Woods, July 2, 1913, Orono, Maine. Mr. Woods reports finding the species on wild daisies and only in one field. The writer has compared two male specimens with European representatives of *O. mutabilis* determined by Reuter, and finds them identical in structure of the genital claspers as well as colour. *O. mutabilis* Fallen is easily distinguished from *O. saltator* Hahn by the pale or yellowish inner half of the clavus and the black tibiæ. The writer has not seen a specimen of *saltator* collected from North America. Provancher (1886) records *O. saltator* from Canada, and his description fits that species very well. Mr. Van Duzee (Can. Ent., 44: 322), in reviewing the Provancher collection of Hemiptera, states: "136. *Orthocephalus saltator* Hahn. A Capsid new to me but certainly not the European *saltator* Hahn." If *O. saltator* Hahn has been taken in North America the writer would appreciate having the matter brought to his attention. Mr. Van Duzee in his recent tables to the genera of Miridæ left out the genus *Orthocephalus* for want of material from this continent.

Halticus apterus Linnaeus.

The writer has seen only one specimen of this species taken in North America, and that was received from Mr. H. M. Parshley who will shortly publish the record from the New England States. This specimen was compared with European material at the U. S. National Museum and found to be identical.

Halticus citri Ashmead, which is our most common species, has in the past frequently been labeled *apterus*. It appears under

three names in the Uhler collection and in the U. S. National Museum collection. *Halticus apterus* is easily recognized by the large, robust, convex form, the black and very shining dorsum without the golden scale-like pubescence.

Subfamily ORTHOTYLINÆ. Tribe ORTHOTYLINI.

Cyrtorrhinus caricis Fallen.

12 ♂ ♀, Sept. 10-17, Rockaway Beach, Long Island, N.Y. (H. Ruckes). ♂ 2 ♀'s, Sept. 5-10, Sea Cliff, N. Y. (Nathan Banks). ♀, Sept. 30, Lakehurst, New Jersey, (H. G. Barber).

This species adds another to our fauna of those well known in Europe. In the past Uhler had placed his *Orthotylus marginatus* as a *Cyrtorrhinus*, but to date no species from this country has been allowed to remain in that genus. The writer has worked over all the literature on *Cyrtorrhinus caricis* Fallen and finds the material here recorded agrees with that species in every respect. The small size, rounded black head with two pale spots on the vertex, black thorax and scutellum, pale legs, clavus and inner half of the corium fuscous with the embolium and outer half of corium pale greenish, will serve to distinguish the species at once.

Saunders (British Heteroptera, p. 283) records the species from "amongst rushes," and judging from the Long Island locality records the species will probably be found breeding on *Carex* or other plants in the Cyperaceæ.

Heterotoma merioptera Scopoli.

♀, Aug. 5, 1915, Honeoye Falls, New York, (M. D. Leonard). This interesting addition to our fauna was taken by Mr. Leonard on the land of one of the large importing nursery firms situated at Honeoye Falls, N. Y. It has doubtless been introduced in the nursery stock shipments or in the packing that comes around the stock. In this way we have got and will probably continue to import insects that deposit their eggs in the stems of various plants.

Saunders (British Heteroptera, p. 295) gives a good account of the species which is easily recognized by the rugose character of the membrane and the inflated second antennal segment. The writer has compared the above specimen with forms from Spain and England and finds it to be identical.

Subfamily MIRINÆ. Tribe MYRMECORINI.

Pithanus maerkelii Herrick-Schaeffer.

This interesting Mirid was first reported from the United States by Mr. C. E. Olsen (Bull. Brooklyn Ent. Soc., 10 : 34) who took specimens on Long Island, N. Y. A specimen was taken next at White Plains, N. Y., by Mr. Torre Bueno, and during the past year the writer received a specimen from Mr. H. M. Parshley, collected at Eastport, Maine, by Mr. C. W. Johnson.

The writer took ♂, 11 ♀'s, June 27, 1916, at Honeoye Falls, N. Y., and other specimens were taken at the same time by Mr. Wm. T. Davis who was present on the trip. The species was swept from grasses growing along the edge of land set to nursery stock, and thus may have been imported locally at that place. The writer took one female specimen which had fully developed wings, and this form is, according to Saunders (British Heteroptera, p. 219), "very rare."

Species of Doubtful occurrence in North America.

The writer has recently completed a revision of the genus *Lygus*, and during the course of researches on the material from North America came to the conclusion that the records of *Lygus contaminatus* Fallen, *Lygus lucorum* Meyer, and *Lygus viridis* Fallen, have been cited in error. In the case of *Lygus viridis* Reuter (1909), the writer was able to study one of the specimens and finds it to be different from the European *viridis* Fallen: having structural points of difference which will be shown in the forthcoming paper on *Lygus*. The writer has studied European specimens of the above species which were determined by Reuter, and are now to be found in the collection of the U. S. National Museum. The records of *contaminatus* and *lucorum* have doubtless been based on certain colour forms of *Lygus apicalis* which species has a wide distribution in North America.

Neobothynotus modestus Wirtner (Ent. News, 28 : 33, 34).

The writer is unable after a careful study of the literature to find generic points of difference between *Neobothynotus* Wirtner and *Bothynotus* Fieber. Furthermore, the description of *N. modestus* Wirtner does not appear to differ from the description of *Bothynotus pilosus* Boheman, which species is well described by

Reuter (Hemip. Gym. Eur., V, p. 7) and Saunders (British Heteroptera, p. 263). The writer strongly suspects, though regretfully, that the above represents an importation of *Bothynotus pilosus* Boheman on some of the shrubbery in Col. Huff's park.

SOME NEOTROPICAL MEGACHILID BEES.

BY T. D. A. COCKERELL, BOULDER, COLO.

The specimens recorded below are in the U. S. National Museum.

***Anthidium chubuti* Cockerell.**

Both sexes from Chubut, Patagonia (from W. F. H. Rosenberg). There is great variation in size, and the femora may show much or little black. The male, not previously known, differs by having the clypeus and space between clypeus and eyes, and mandibles except apex (which is bidentate) and extreme base pale yellow; vertex with either a complete band or a pair of spots; face with pure white hair; greater part of pleura with pure white hair, but posteriorly it is black; vertex, mesothorax and scutellum (except posteriorly) with fulvous hair; occiput and metathorax with black hair, front with sooty; marks on abdomen variable, the posterior three pairs may be reduced to spots. The large male has a small third tooth on the mandibles. *A. patagonicum* Schrottky, published about a month and a half later, is evidently the same species.

***Anthidium rubripes* Friese.**

Male.—Mendoza, Argentina (C. S. Reed). The hair on head and thorax is white, not "yellowish brown," as Friese describes; but the insect otherwise agrees, and there is no other species from Mendoza like it. The species is closely allied to *A. chubuti*, but narrower and quite distinct. The male mandibles are bidentate at end, and have on inner side a large, black, triangular plate.

***Hypanthidium taboganum*, sp. n.**

♂, (Type). Length 7–8 mm.; black and bright chrome yellow, only the tegulae, knees, scape behind (in front yellow) and base of flagellum red; head and thorax extremely densely punctured, with scanty hair, that on head and thorax above fox-red; yellow markings as follows: mandibles except apex, clypeus, July, 1917.

dog-ear marks, band like lateral face-marks (ending in point at level of middle ocellus), entire occipital band going half-way down cheeks, small spot on tubercles, lateral and anterior margins of mesothorax (except a wide interval on anterior middle), axillæ, broad hind margin of scutellum, anterior and middle tibiæ and basitarsi; in front, elongate basal and transverse apical mark on hind tibiæ, hind basitarsi in front and spot on second tarsal joint, oblique mark at extreme sides of second abdominal segment, and all of the other segments except extreme base and translucent reddish apical margin; mesopleura with large, distinctly separated punctures; wings dilute fuliginous, apicostal region darker; first three abdominal segments finely punctured, the others with large punctures; no lateral spines; seventh segment very broadly rounded, with a median pit. The anterior femora may be red above except at base.

♀.—Similar, but clypeus black, mandibles with only a small, yellow spot, no dog-ear marks, more red hair on scutellum, yellow of legs reduced and more or less reddened, hind tibiæ black except a small basal spot, all the basitarsi black, anterior femora with a yellowish-red band on apical half; yellow bands of abdomen narrower, the fourth notched behind. Ventral scopa shining white.

Hab.—Taboga Island, Panama, June 9 and 11, 1911, (*A. Busck*); also one Feb. 19, 1912, (*A. Busck*). Related to *H. aureocinctum* and *H. panamense*, but easily separated by the yellow and black legs and absence of discal stripes on mesothorax. From the descriptions, it seems also to be somewhat allied to the *Anthidium mexicanum* and *A. agnatum* of Cresson; these species have been supposed to belong to *Dianthidium*, but the types should be examined to see if they are possibly *Hypanthidium*.

***Hypanthidium melanopterum*, sp. n.**

♀.—Length about 8 mm.; black and chrome yellow; yellow markings as follows: lateral face-marks (consisting of a large patch on each side of antennæ, sending a narrow stripe upward along orbits), entire occipital band going a little way down cheeks, narrow anterolateral margins of mesothorax, rather narrow band bordering scutellum and axillæ, slightly broken band on first abdominal segment, small mark on each side of second, entire bands on third

to sixth, on sixth covering segment except margin; tegulae bright ferruginous; wings fuliginous; legs black, the anterior femora (except basally) and tibiae red in front; a small, red tubercle below each eye; scape yellow in front, otherwise red with a dusky shade; base of flagellum (and under side more or less) red; ventral scopa glittering white. Mesothorax densely and strongly punctured.

Hab.—Mexico (Baker collection 2154). Easily known from *H. taboganum* by the band on first abdominal segment. It is allied to *H. ecuadorium* (Fries), but easily separated by the shape of lateral face-marks, less projecting and much more narrowly margined scutellum, very coarse punctures of thorax above (especially large on scutellum), entirely black tubercles, etc.

***Stelis veraecrucis*, sp. n.**

♀.—Length about 7 mm.; black, with yellow markings as follows: clypeus except a very large semicircular area above (the yellow area thus like two mountains with a valley between), narrow lateral face-marks extending a little above level of antennae, a small, elongate spot at inner upper side of each antennal socket, a very narrow, occipital band, scutellum and axillae except anterior border, (no other yellow on thorax), and entire bands on abdominal segments 3 to 6; legs very dark reddish-brown, without markings; tegulae black; wings fuliginous, the costal region darkest, second recurrent nervure going far beyond end of second submarginal cell; abdomen partly obscure reddish beneath at base; venter with short, white hair. Antennae black, with red spot at apex of scape, and third joint red beneath; head and thorax above with excessively large, crowded punctures, on mesothorax so large that a line from anterior to posterior end traverses only about a dozen; scutellum prominent; base of metathorax with a transverse band of large pits.

Hab.—Medellin, Vera Cruz, Mexico (*H. H. Hyde*; Baker coll. 1785). For the interpretation of this Baker number see Ann. Mag. Nat. Hist., Feb. 1905, p. 201. Nearest to *S. laticincta* Cress., but very distinct by the large punctures of thorax, first two abdominal segments all black, etc. The insect has a close superficial resemblance to the two species of *Hypanthidium* described above.

BOOK NOTICE.

A Year of Costa Rican Natural History, by Amelia Smith Calvert, Sometime Fellow in Biology, Bryn Mawr College, and Philip Powell Calvert, Professor of Zoölogy, University of Pennsylvania. The Macmillan Co., New York; The Macmillan Co. of Canada, Toronto Feb, 1917. xix+577 pp., with maps and numerous illustrations from photographs, including coloured frontispiece. Price \$3.00.

The single year (May 1, 1909 to May 10, 1910) spent by Professor and Mrs. Calvert in Costa Rica was a full one indeed, to judge by this interesting chronicle of their experiences in that remarkable land. To have gathered, in a single year, the vast quantity of information contained within its pages must have demanded great concentration of effort, both mental and physical. This information concerns not only the animals and plants of the country, in which the authors were chiefly interested, but also the climate and topography, the life and customs of the people, conditions and methods of travel, and many other matters of interest to the visitor.

As the main object of the trip was the study of the dragonflies of the country, the references to these insects are proportionately numerous, and among the more interesting discoveries in this field were the finding and rearing of the larvæ of *Mecistogaster modestus*, which breeds in the water between the leaves of epiphytic bromeliads (plants belonging to the Bromeliaceæ or Pine-apple family), the larva of *Cora*, which possesses lateral abdominal gills, recalling those of the mayflies and Sialids; and the habits of certain waterfall dwellers belonging to the genera *Thaumatoneura* and *Argia*. These have already been described at length by Dr. Calvert in a series of papers published in the Entomological News.

A great many other matters of interest to entomologists were brought to light, not only concerning dragonflies but numerous other groups of insects, e. g., observations on the swarming and migratory flights of butterflies and day-flying moths, the habits of leaf-cutting ants and the curious relationship between the ants found upon the Bull's Horn Thorn and their host tree, interesting cases of apparent mimicry and protective coloration, curious and striking insects of various kinds, such as the huge horn-bearing Scarabæidæ, (*Dynastes*, *Megaceros*, etc.), strange lepidopterous

larvæ, particularly the weird caterpillars of some of the Megalopygid moths; and hosts of other observations of interest to students in all branches of entomology.

Much is also told of the birds, reptiles, mammals and other animals observed, while the descriptive notes on the plants, illustrated by numerous photographs, will not only be of interest to botanists, but will be of much value in giving to the general reader a mental picture of the types of vegetation, characteristic of tropical America.

Among the most interesting chapters is the one describing the ascent of the volcano Irazu, which gives a detailed account of the volcano itself with its various craters and many notes on the plants and animals observed there; and the final chapter, dealing with the destruction of Cartago by earthquakes in the spring of 1910, just at the close of the authors' year in Costa Rica. Cartago was chosen as their headquarters, from which excursions to various parts of the country were made, the materials collected being always brought here and kept in a room in the hotel, which served as a laboratory. One of the early chapters (chap. 4) is devoted to a description of the town and its life, as it existed before the earthquake, while the last chapter, "*Carthago deleta est*," gives a vivid and detailed picture of this terrible event, in which the entire town was wrecked and nearly 300 people were killed, the authors themselves suffering a very narrow escape. Fortunately, although the living larvæ, which represented the rearings of many months, were nearly all killed, the preserved specimens, notes, journals and photographs were uninjured.

The book is remarkable for the extreme care and accuracy which characterize both matter and typography. The authors have not been content merely to state their own experiences, but have acquainted themselves with a large body of literature treating of the various subjects upon which they have written. One of the most useful features of the book is the copious bibliography contained in Appendices III and IV, the former giving a list of "papers based in whole or in part on the collections made by the authors in Costa Rica," the latter "a list of selected literature relating chiefly to the Natural History of Costa Rica, exclusive of that cited in Appendix III."

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE STRAWBERRY ROOT WEEVIL IN BRITISH COLUMBIA.

BY R. C. TREHERNE, ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Since issuing Bulletin No. 8, of the Dominion Entomological Branch, on the Strawberry Root Weevil (*Otiorhynchus ovatus*) in British Columbia, certain studies have been undertaken which may well be recorded at the present time.

This weevil still maintains its high degree of importance in the strawberry plantations of the Province. It has gained access to the fine strawberry plantations of the Saanich Peninsula, near Victoria, to a degree which is causing considerable apprehension among the growers.

While primarily an insect adapted to the moist, cooler areas adjacent to the Pacific Ocean, it has been reported as causing considerable damage to plantations in the arid transitional areas of the interior. During the past two years reports of this nature have been received from northern points in the Okanagan Valley, and more recently it was observed in considerable quantity at Grand Forks. Many enquiries further have been received from the Lower Kootenay country, particularly Kaslo, Nelson and Boswell. It has not, as yet, been reported from the Creston district, but there is no doubt that its presence will be felt in this latter section at no distant date, even supposing it does not occur there at present.

It has been claimed that this insect is an introduced species from Europe. I find this very hard to believe, and I would be very much interested to find out on what grounds this statement is advanced. I have taken it at various altitudes up to 4,000 feet in the mountains, far removed from any cultivated land, and I have seen it on isolated, rocky islands of the Pacific Coast of British Columbia. In one instance, I remember finding it on a rocky

island, almost devoid of grassy vegetation and supporting only a stunted growth of fir trees. Considering the fact that this island was several hundred yards from the coast line and at all tides entirely surrounded by salt water, combined with the fact that the weevil is unable to fly, it becomes increasingly hard to believe that this insect is other than an indigenous species.

All evidence points to this weevil being primarily a grass-infesting insect, and further that it is more or less uniformly distributed throughout the southern sections of British Columbia. It will attack strawberry plantations when the native vegetation is removed and it has received its name, not because strawberries alone are attacked, but because this fruit offers a suitable form of nourishment to its taste. Strawberries being grown in consolidated areas under a high state of cultivation, naturally suffer to a marked extent. It is useless for growers to consider it advisable to purchase plants from non-infested districts, as is so often suggested. The statements made above naturally preclude this form of suggestion, apart from any remarks on the egg-laying period in relation to transplanting.

It seems a foregone conclusion that all strawberry plantations in this part of the world, are doomed to the possibility of infestation despite the efforts of the growers. Much, however, may be done to alleviate the nuisance. The control measures, while given on previous occasions, may well be mentioned again. They are briefly as follows:

1. Rotation of crops, which includes naturally the growing of strawberries in proportion to the land available on individual farms.
2. The production of strawberries on the "one" or "two-year cropping plan," which includes the choice of varieties suitable to these plans.
3. The removal of old or infested plantations by ploughing at the end of the egg-laying period, which ordinarily would mean in September. Such land should be thoroughly cultivated in the autumn and kept devoid of all vegetation during the winter.

If these suggestions are properly put into force it may reasonably be expected that little damage would result from the attacks of the weevil larvæ on the root system. It is urged that districts liable to infestation, entering upon the industry of strawberry culture, should adopt these plans before they are forced to do so by the presence of the weevil.

Experience has shown that it is common to find at times well over a hundred larvæ at work on the roots of individual plants, growing on the hill system, and yet the plant would not be dead. A totally unprofitable crop is the result, but the plant itself survives the ordeal. On enquiry it may be found, almost invariably, that the plantation is entering upon its third cropping year. Frequently one hears of severe infestation in young plantations, but in such cases it has been found that the land has been made the recipient of continuous crops of strawberries for several years. It is exceptional to find plantations devastated in the first year of growth or virgin soil, although a few instances of this have been reported.

On the Effect of "Burning Over" a Strawberry Field as a Means of Controlling the Strawberry Root Weevil.

During the past summer experiments were conducted on the efficiency of burning over an old strawberry plantation just previous to the termination of the crop. The plants, growing on the hill system, on approximately $1\frac{1}{2}$ acres, were "mattocked up" and roots, tops and straw-bedding raked into windrows. On about half the field the strawberry rows were raked into one windrow, while on the other half four rows were raked into one row. The plants were left in these rows for about 24 hours, the day being bright and sunny. In this way the plants were allowed to dry, making burning easier, and secondly those beetles left in the old strawberry rows would be forced to shelter in the windrows, during the night, as to a bait. Finally the rows were fired at a convenient point to utilize the prevailing breeze.

At the time this work was done the great majority of the

adults had transformed from the pupæ in the soil and were hidden away among the debris around the plants. Egg laying was in full swing and comparatively few larvæ and pupæ were left in the ground.

The results attending this experiment showed that a great many adults were destroyed by the action of the heat, but on the other hand a great many survived. The best results, as to mortality, were shown in the larger windrows where the heat appeared more sustained and concentrated. A number of adults were contained in small wooden boxes and glass vials, which were in turn sunk to the level of the soil in the row, and it was shown that without exception all perished. Careful observations were taken as soon as the fire had passed over to ascertain the general results on a practical scale, and it was interesting to note the remarkable ingenuity displayed by the weevils to avoid destruction. Under nearly every clod of earth or beneath compact piles of straw, which had not become ignited, were found small groups of adults, sometimes to the number of twenty, packed together as far away as possible from the source of heat. These weevils were perfectly normal and unharmed, and some laid eggs in captivity after removal from the field. In some instances adults had burrowed into loose soil to avoid destruction.

The general results of the work showed that burning the plantation at the time when the greatest number of adults were on the surface possessed only a half measure of success. The adults that survived would undoubtedly migrate to the nearby strawberry plantations and this, taking place at the season of the year when egg laying was in progress, was precisely what we should aim to avoid.

It may be said, however, that better results would probably attend this method of control if the roots of the plants were shaken free of soil and the lumps of earth broken and compacted in the windrow. If this were done burning of old plantations might be added to the control measures already mentioned.

NEW SPIDERS FROM CANADA AND THE ADJOINING STATES.

BY J. H. EMERTON, BOSTON, MASS.

In examining a large number of spiders from Canada and the northern United States, the following species appear to be undescribed. Six of them are from Metlakatla and other parts of the coast of British Columbia, collected by J. H. Keen and now in the collection of Nathan Banks, by whom several had been recognized as new and partly prepared for publication. Three are from Departure Bay on Vancouver Island, collected by T. B. Kurata, of Toronto. Two are from the mountains near Banff, collected by N. B. Sanson. Four are from Mt. Whiteface in the Adirondack Mts. of Northern New York, collected by the writer and C. R. Crosby, of Cornell University. The two *Philodromus* are from Ontario; one of them very common all over the eastern part of Canada.

***Lophocarenum sculptum*, n. sp.**

A little over 2 mm. long. Legs and palpi dull yellow. Cephalothorax and abdomen dark brown. Abdomen with a hard spot covering the whole back of the male and nearly the whole of the female as in *L. excavatum*, and in several *Ceratinella*. The abdomen is covered with depressed spots around the hairs. The

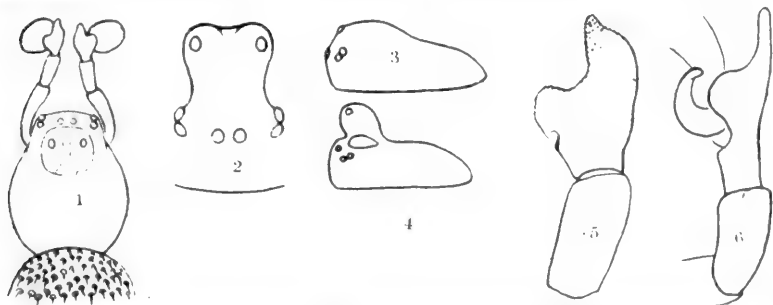


Fig 12.—*Lophocarenum sculptum*.—1, back of cephalothorax, part of abdomen and palpi of male; 2, front of head of male; 3, profile of cephalothorax of female; 4, profile of cephalothorax of male; 5, male palpus seen from above; 6, male palpus, outer side.

head of the male has a small, abrupt hump, carrying the upper middle eyes near the top; (Fig. 12, 2 and 4) it is slightly notched in the middle and constricted at the sides and in front, and under the

constricted part on each side is a deep groove. The female has a slight elevation of the head just behind the eyes. (Fig. 12, 3.) The male palpi are moderately long with the patella twice as long as it is wide, and the tibia widened at the end, with a pointed process on the inner side extending over the tarsus. (Fig. 12, 5 and 6.)

Metlakatla, B.C., from J. H. Keen in Nathan Banks' collection.

***Aræoncus patellatus*, n. sp.**

2 mm. long, pale without markings. The head is slightly elevated, more in the male than in the female. The upper eyes are more than their diameter apart, and farther apart in the male than in the female, almost touching the lateral eyes. (Fig. 13, 3.) The front middle eyes are small and near together, and as far from the upper eyes as these are from each other. The lateral eyes are in pairs touching each other, and surrounded by a common, dark border. The space between the eyes is covered by short, stiff hairs directed upward. (Fig. 13, 3.) The male palpi resemble slightly



Fig. 13.—*Aræoncus patellatus*.—1, epigynum; 2, male palpus, outer side; 3, head of male from above.

those of *Aræoncus bispinosus*. The patella is, as in *bispinosus*, twice as long as the tibia. The tibia is widened at the end, twice as wide as it is long, and has on the inner side a short, sharp tooth directed forward. (Fig. 13, 2). There are two rows of stiff hairs on the top of the tibia extending parallel as far as the anterior border and there turning toward the inner tooth. The tarsal hook curves in a half circle and ends in a dull point. (Fig. 13, 2.) The epigynum has two median processes, (Fig. 13, 1) the inner one T-shaped, much like the middle lobe in many *Lycosidæ*, the outer half as long and paddle-shaped.

Metlakatla, B.C., J. H. Keen.

***Gongylidium curvitaris*, n. sp.**

4 mm. long. Cephalothorax and legs pale yellow-brown. Abdomen gray with small, light spots of irregular shape and

arrangement, the middle ones sometimes in pairs. Size and general appearance like *Pedanostethus riparius*. The head is only slightly narrowed in front, but more in the male than in the female. The upper eyes are all of the same size and equal distances apart, the lower front pair half as large as the others and close together, but not touching. (Fig. 14, 5.) In the male the metatarsi of the front

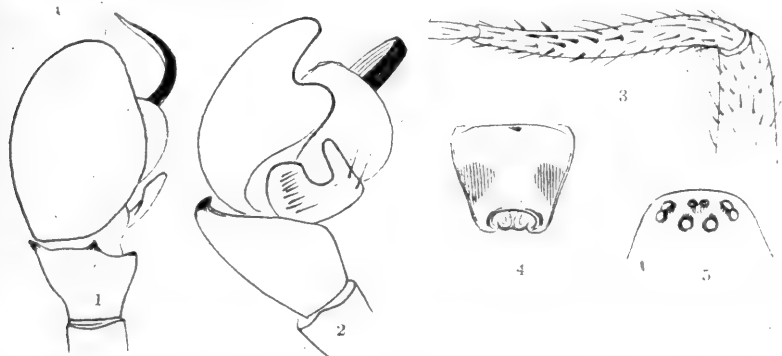


Fig. 14.—*Gongylidium curvitaris*.—1, male palpus, from above; 2, male palpus, outer side; 3, metatarsus of first leg of male; 4, epigynum; 5, eyes.

legs are slightly curved, and some of the hairs near the middle of the joint are thicker than the others. (Fig. 14, 3.) The male palpi resemble closely those of *G. (Tmeticus) brunneus* Em. of the White Mountains, but the tibia has a sharper and more recurved point, (Fig. 14, 2) the tarsal hook though nearly of the same shape has the point less widened and the palpal organ has a long, stiff tube curved in a half circle and extending beyond the end of the tarsus. (Fig. 14, 1 and 2.) The epigynum is like that of *brunneus* but longer, projecting farther from the surface of the abdomen (Fig. 14, 4).

Mt. Whiteface, Adirondacks, N.Y., in moss in spruce forest at 4,000 ft., May 24, 1916.

***Gongylidium macrochelis*, n. sp.**

3 mm. long. Abdomen gray. Cephalothorax, legs and palpi dull orange. Resembles in size and colour *Tmeticus armatus* Bks., with which it was found. The head is low and wide, and the mandibles large and thick with a large tooth on the front and inner side as in *probatas* and *tridentatus*. The front of the mandibles has scattered elevations at the base of the hairs and on the

outer sides are fine, parallel, horizontal lines. There are three or four small teeth on the inner side of the claw groove. (Fig. 15, 1 and 2.) The maxillæ are wide and have several scattered elevations with one larger one near the front. The male palpi are

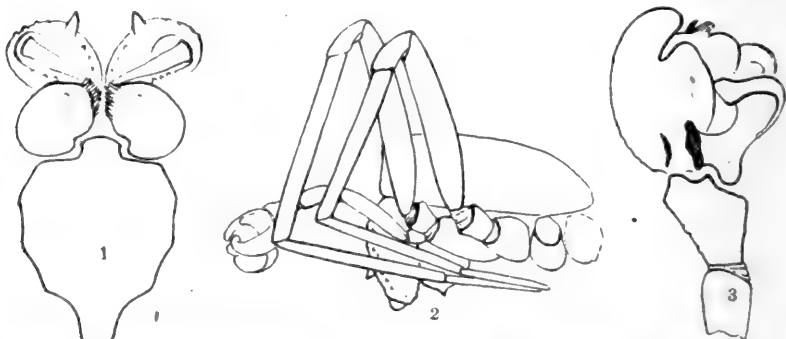


Fig. 15.—*Gongylidium macrochelis*.—1, sternum, maxillæ and mandibles of male; 2, side of male; 3, male palpus, outer side.

long, with both patella and tibia longer than wide. The tibia is widened toward the end but has no large processes. (Fig. 15, 3.) The tarsus is short and round and has a deep notch on the outer side. The tarsal hook is of a complicated shape, shown in (Fig. 15, 3). The base is thickened and near it is a round tooth turned toward the tibia. The end of the hook curves outward and reaches back to the edge of the tarsus.

Sulphur Mountain, Banff, N.B. Sanson. In April on snow in company with *Tmeticus armatus*.

***Gongylidium unidentatum*, n. sp.**

1.5 mm. long. Cephalothorax and abdomen gray and legs pale. Eyes as in *Tmeticus bidentatus*. Mandibles without any



Fig. 16.—*Gongylidium unidentatum*.—1, male palpus, above; 2, male palpus, outer side; 3, male palpus, inner side.

large tooth in front. Tarsus of male palpus extending over the tarsus half its length and pointed, with the point slightly turned down. (Fig. 16, 1, 2 and 3.) Tarsal hook simple.

Mt. Whiteface, Adirondacks, N.Y., C. R. Crosby. One specimen.

***Microneta clavata*, n. sp.**

2 mm. long, pale yellowish. Both sexes of the same size. The male palpi are small and coloured like the legs. The tibia is thickened toward the end, where it is as wide as long. The tarsal hook is simple in form, the basal half straight, following the edge of the tibia and the terminal half curved in a half circle (Fig. 17, 3.) The epigynum is large, with a smooth, rounded end extending backward, turned a little way from the surface of the abdomen. (Fig. 17, 4.)

Wilmington Notch, Adirondacks, N.Y. C. R. Crosby.

***Microneta pallida*, n. sp.**

A little over 2 mm. long and pale, without any markings. The abdomen is slightly thickened in front and pointed behind. The front of the head extends a little forward beyond the mandibles. The mandibles are thickened at the base and have a few



Fig. 17.—*Microneta pallida*.—1, outer side of male palpus; 2, profile of head and mandibles, *Microneta clavata*.—3, male palpus; 4 epigynum.

stiff hairs on the front as in *angulata* and *formica*. (Fig. 17, 2.) The male palpi have the tibia thickened in the middle and the end extended on the upper side over the tarsus. (Fig. 17, 1.) The tarsal hook is wide and flat as in *angulata*. The tarsus has on the upper

side two processes, neither very large; one near the base and the other in the middle.

Departure Bay, Vancouver Is., 1913, T. B. Kurata.

***Microneta orcina*, n. sp.**

2 mm. long. Legs pale. Cephalothorax pale yellow brown. Abdomen pale gray with lighter spots in pairs as in several *Diplostyla* and *Bathypantes*. (Fig. 18, 1.) The cephalothorax is nearly as wide as long, with the front of the head not much over half as wide. The male palpi have the tibia enlarged at the end without

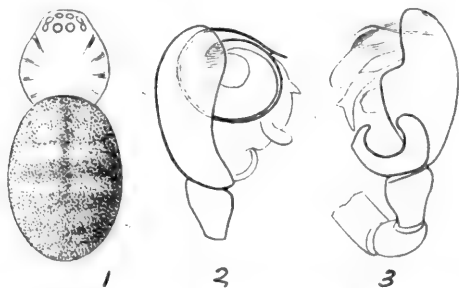


Fig. 18.—*Microneta orcina*.—1, dorsal markings of male; 2, male palpus; 3, male palpus, outer side.

any processes. The tarsal hook is straight where it crosses the end of the tibia and then curves in a half circle to a point, and on the outer side near the end is a slight projection (Fig 18, 3.) The palpal organ has a long, slender, transparent tube which curves around the end of the palpus in more than a complete circle. (Fig. 18, 2.)

Inverness, B.C. J. H. Keen. One specimen in collection of N. Banks.

***Diplostyla inornata*, n. sp.**

2 mm. long. Abdomen gray without markings or with only a trace of markings. Cephalothorax gray but lighter than the abdomen. Legs pale without markings. Palpi of male resembling those of *nigrina*, except that the tarsal hook is only slightly widened at the tip (Fig. 19, 5) and the basal process is slightly curved inward over the coil of the tube. (Fig. 19, 6.)

Mt. Whiteface, Adirondacks, N. Y., August, 1916.

Diplostyla keenii, n. sp.

3 mm. long. Cephalothorax pale with light gray radiating markings. Legs long and pale with faint gray rings at the end and middle of each joint. Abdomen pale with distinct gray markings, two pairs of large spots more or less connected on the front

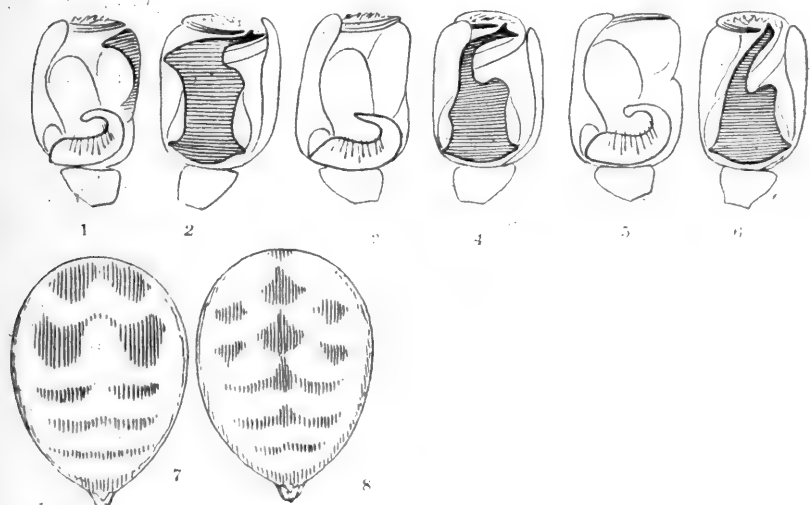


Fig. 19.—*Diplostyla*.—1 and 2, male palpus of *D. keenii*; 3 and 4, male palpus of *D. brevipes*; 5 and 6, male palpus of *D. inornata*; 7, dorsal markings of *D. keenii*; 8, dorsal markings of *D. brevipes*.

half and three transverse on the hinder half, the front one divided in two. (Fig. 19, 7.) The male palpus has the tarsal hook blunt pointed. (Fig. 19, 1.) The basal process is wide in the middle, with the inner corner much elongated. The slender portion turns off at a right angle. (Fig. 19, 2.) The epigynum is of the usual shape but very short, as in *alboventris*.

Metlakatla, J. H. Keen, in collection of Nathan Banks.

Diplostyla brevipes, n. sp.

3 mm. long. Cephalothorax and legs pale, dull yellow without any markings. Abdomen whitish with gray markings; on the front half, two spots in the middle line, each partly connected with two lateral spots; behind these three transverse marks, the front one partly divided in three (Fig. 19, 8.) The legs are unusually

short, the first femur but little longer than the cephalothorax. The male palpus has the tarsal hook pointed at the tip, and it is more pointed at the base than in the other species. (Fig. 19, 3.) The basal process of the palpal organ has the slender portion bent in the middle at nearly a right angle, and its point has a tooth turned outward as in *alboventris*, (Fig. 19, 4.) The epigynum has the two processes straight and of middle length.

Metlakatla, B.C. J. H. Keen, in the collection of Nathan Banks.

***Pardosa metlakatla*, n. sp.**

In size, colour and markings resembling *P. glacialis*, but differing from it in the epigynum and male palpi. The epigynum is narrow like that of *atra*, but the middle lobe is shorter and wider and widened at the end as in *sternalis*. (Fig. 20, 3.) There is no large depressed area as in *glacialis*, and there is hardly a trace of the anterior pits. The palpal organ has the basal process somewhat crescent-shaped, the lower point being shorter and the upper more pointed than in *glacialis*. (Fig. 20, 4.) The small process on the outer side which supports the end of the tube is less pointed than in *glacialis*. The tarsus is longer and more pointed, and the tibia less thickened than in *glacialis*, and lighter coloured and less thickly covered with hair.

Metlakatla, B.C. J. H. Keen. Mountains north of Vancouver. W. Taylor.

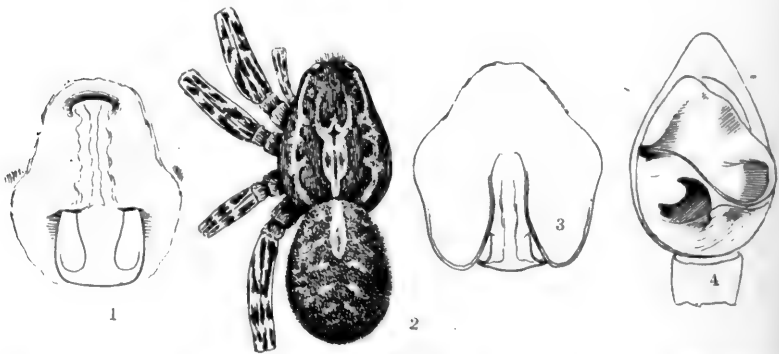


Fig. 20. *Pardosa rancouveri*. 1, epigynum; 2, dorsal markings. *Pardosa metlakatla*.—3, epigynum; 4, male palpus.

***Pardosa vancouveri*, n. sp.**

7 mm. long. Gray with the colour much broken into spots of irregular shape. The cephalothorax has three light stripes, the middle one two-thirds as long as the cephalothorax, widened at the front end and divided in three. (Fig. 20, 2.) The side stripes extend the whole length of the cephalothorax and are of irregular width. The legs are darkest at the base, and have broken and irregular spots on all the joints. The abdomen has the usual long middle spot at the front end, behind which are small, irregular, light spots in pairs. On the under side the colours are somewhat lighter on the coxæ and femora, and the abdomen has three indefinite dark stripes on a light ground. The epigynum is long and partly divided into two parts. The anterior end has a wide, distinct pit, from which a soft and narrow ridge extends backward as far as the transverse division. (Fig. 20, 1.) The posterior half has a wide middle lobe in which is a ridge approaching the form of a T. (Fig. 20, 1.) The male is yet unknown.

Departure Bay and Vancouver, in gardens and fields. T. B. Kurata.

***Pæcilochroa columbiana*, n. sp.**

Cephalothorax 2.5 mm. long. Abdomen variable in size according to contents. Cephalothorax orange brown with black hairs. Legs orange yellow except the femora, which are dark like the cephalothorax, the first and second femora sometimes darker than the others. The abdomen is black with a white, transverse stripe at the front, two transverse spots in the middle, and sometimes a few white hairs in front of the spinnerets. On the under

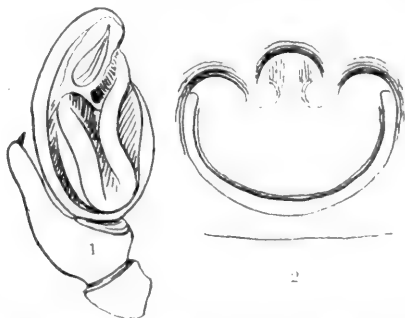


Fig. 21.—*Pæcilochroa columbiana*. 1, male palpus, under side; 2, epigynum.

side there are no definite markings, but the abdomen is usually lighter in the middle and toward the front, and the posterior coxæ are lighter than those in front. The male is darker than the females. The epigynum has a middle and two lateral pits in front, and a rounded lobe directed backward and fitting into a larger depression. (Fig. 21, 2.) The male palpus somewhat resembles that of *P. montana*, but the process of the tibia is smaller and the point less turned backward. (Fig. 21, 1.) This species is distinct from *P. pacifica* Bks., with which it has been compared.

Departure Bay, Vancouver Island, 1913, T. B. Kurata.

***Philodromus canadensis*, n. sp.**

5 mm. long. Second femur of male 3 mm. Marked in gray (Fig. 22, 3) much like *P. vulgaris* and like *P. bidentatus* with which it is sometimes associated, but it does not have the sharp division between the dorsal and ventral colour areas that is usual in *vulgaris*. It has somewhat shorter legs than *bidentatus*, especially in the males. The male palpi resemble those of *vulgaris*, but the outer

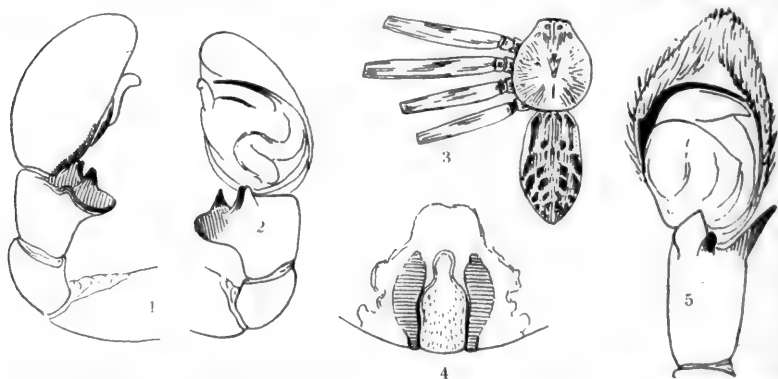


Fig. 22.—*Philodromus macrotarsus*.—1, male, palpus, upper side; 2, male palpus, under side. *Philodromus canadensis*.—3, dorsal markings; 4, epigynum; 5, male palpus, under side.

process of the tibia is narrower and the under process more triangular and with a short truncate tooth at its base, a little curved toward the outer side of the palpus. (Fig. 22, 5.) The tibia is wider in the middle than in *vulgaris*, and widened more on the inner than on the outer side. (Fig. 22, 5.) The epigynum resembles that of *vulgaris*, but is shorter. (Fig. 22, 4.)

Common about Montreal and Ottawa and westward to Lake Nipigon and Prince Albert; Grand Isle, Lake Champlain; Sandusky, Ohio.

***Philodromus macrotarsus*, n. sp.**

4 mm. long. Femur of second leg 3 mm. The specimen, a male, is freshly molted and light in colour. The abdomen has a series of transverse marks in light and dark gray, and the legs are indistinctly ringed in the middle and near the ends of the joints. The male palpus has the tibia twice as wide as long, most of the width being on the outer side. (Fig. 22, 1.) On the projecting portion is a black pointed process directed forward and visible from above or below. On the under side is a double process also directed forward, the outer half dark and the inner half translucent brown. The palpal organ has on the end near the outer side a short, stout process curving downward and opposite to it is the dark pointed tube. (Fig. 22, 2.)

Vineland, Ontario. W. A. Ross, Sept., 1916.

***Chalcoscirtus carbonarius*, n. sp.**

Female 4 mm. Male 3 mm. long. Dark gray, the male almost black, the female with the abdomen lighter than the cephalothorax and lighter below than above, without any markings. There are very small, scattered hairs all over the body and the skin is roughened with fine, irregular lines, and in some lights is

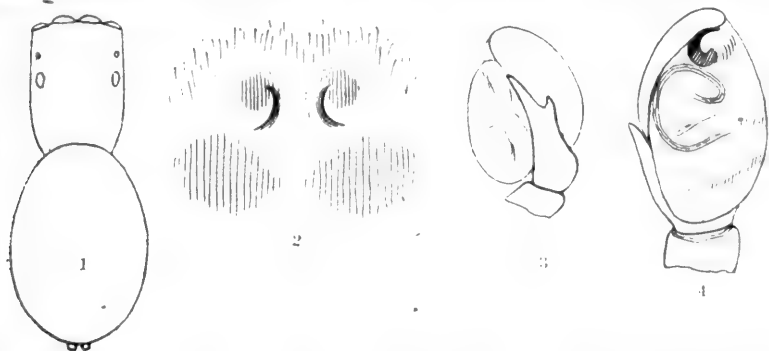


Fig. 23.—*Chalcoscirtus carbonarius*.—1, outline of female; 2, epigynum; 3, male palpus, outer side; 4 male palpus, under side.

slightly iridescent. The abdomen is longer than the cephalothorax. The cephalothorax is one-half longer than wide, with the

sides straight and parallel. (Fig. 1.) The eye area is wider than long, the front row of eyes covers the whole width of the head, and the small, middle eyes are nearer the upper pair than the front row. The leg of the first pair is not much thicker than the others in either sex, and the tibia has on the under side three pairs of long spines. The mandibles have no teeth under the claw. The male palpi have the tibia as long as wide, with a long process extending half the length of the tarsus and having a sharp tooth in the middle of the upper edge. (Fig. 23, 3.) The palpal organ is oval and thick, extending back at the base over part of the tibia. (Fig. 23, 3 and 4.) The tube is at the tip and is short and curved in a half circle. (Fig. 23, 4.) The epigynum has two small, semi-circular openings behind which the round spermathecae show through the skin. (Fig. 23, 2.)

Simpson summit, 7,000 ft., near Banff; a smaller species, *C. montanus* Banks, is found on Mt. Washington, N. H., above the trees.

ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.—III.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

(Continued from page 240.)

***Elytroleptus floridanus* Lec.**

One example of this rare form was beaten from oak on March 23. It was described from Florida in 1862, and Schwarz records the taking of a single specimen at Haulover.

***Plectomerus dentipes* Olivier.**

Three examples of this small and well-marked Longicorn have been taken by beating oak in November and December.

***Zagymnus clerinus* Lec.**

Schwarz records this species as very rare in the stems of dry palmetto leaves. Five specimens have been taken at Dunedin, three on pine lumber in October and December, the others at electric porch light in June. Two of the five are wholly black, one of them being 19 mm. in length. The others are typical in hue, the head and thorax red and the elytra maculate, the length 13–15 mm.

August, 1917

Cryptocephalus nanus Fab.

One specimen by beating in a wet hammock, March 27. LeConte records* it from Arkansas and Florida. No other Floridian record is known to me.

Cryptocephalus calidus Suff.

One specimen beneath chunk near pond. Not before recorded definitely from Florida.

Pachybrachys stygicus Fall.

Occurs frequently on huckleberry foliage and flowers in autumn and spring. Fall's types were from a number of localities in Florida and Alabama.

Pachybrachys characteristicus Suff.

Fall also records this from several localities in Florida.** One specimen was secured at Dunedin in a wet hammock.

Monoxia batisia, sp. nov.

Elongate-oblong, feebly convex. Fuscous-black, above thickly clothed with short, prostrate, silken yellow pubescence, the blackish ground colour showing in a narrow median line on head and thorax and in some irregular spots and short curved lines along the inner portions of, and some rows of minute dots along the sides of each elytron; antennae and legs reddish-brown, more or less annulate or tinged with fuscous; under surface fuscous, very sparsely and finely pubescent. Head with a broad, shallow but distinct median impression. Thorax nearly twice as wide as long, not narrower at apex than base, sides broadly curved and rounded into the base, which is distinctly, obtusely emarginate at middle, front angles obtusely rounded; disc finely and closely punctate and with a vague median impression and another each side. Elytra one-third wider and five times as long as thorax, sides parallel for three-fourths their length, then curved into the rounded apex; disc more or less uneven, finely, densely and deeply reticulate-punctate. Male with tarsal claws bifid one-third their length, the last ventral broadly and deeply emarginate. Female with claws simple, last ventral truncate or nearly so. Length, male, 3.5 mm.; female, 4-4.3 mm.

*Trans. Amer. Ent. Soc., VIII, 1880, 201.

**Trans. Amer. Ent. Soc., XLI, 1915, 376.

Swept in numbers, January 29—April 2, from the foliage of the fleshy-leaved seaside plant, *Batis maritima* L., which covers large tracts along the inner borders of the mangrove swamps on Hog Island, opposite Dunedin. With the exception of *puncticollis* Say, 7–8.5 mm. in length, this is the only *Monoxia* definitely known from east of the Mississippi River, though LeConte, in 1865,* mentioned one of his types of *obtusa* (now placed as a synonym of his *debilis***) as having been found at Andover, Mass. Horn in his "Galerucini" states,** however, that this locality "is much more than doubtful." From *debilis* *M. batisia* may be known by the much more distinct median impression of head, different form of thorax with the basal margin distinctly emarginate and by the much deeper emargination of the last ventral of male.

In this connection it may be mentioned that Fabricius in 1801†, described from Carolina a *Galeruca atomaria*, the status of which is in doubt. His description, based mainly on colour, is as follows:

"*atomaria*, G.—Pallida, elytrorum sutura, atomisque ferrugineis. Statura parva *G. tenellæ*. [3.2–4 mm.] Antennæ ferrugineæ. Caput ferrugineum, vertice nigro. Thorax marginatus, pallidus, immaculatus. Elytra lævia, pallida, sutura, quæ tamen apicem haud attingit, puncto maiori distincto in medio atomisque ferrugineis. Corpus pallidum."

Habitat in Carolina Mus. D. Bosc.

LeConte (loc. cit. 205) states that "this was probably a species of *Monoxia*," and it was so listed by Gemminger & Harold. It is possible that this is the species I have described as *M. batisia*, but it cannot be so determined from the brief description of Fabricius.

***Haltica nana* Crotch.**

One specimen swept from low herbage, October 26. Horn‡ gives its range as South Carolina to Florida.

*Proc. Phil. Acad. Nat. Sci., 222.

**Since *obtusa* was described first on the same page, it should be made the name of the species, with *debilis* as the synonym.

***Trans. Amer. Ent. Soc., XX, 1893, 86.

†Syst. Eleut. I, 490.

‡Trans. Amer. Ent. Soc., XVI, 1889, 221.

***Haltica marevagans* Horn.**

Taken in some numbers by sweeping the sea purslane, *Sesuvium maritimum* Walt., along a dredged ditch on Hog Island. Feb. 5—March 25. Horn, (loc. cit., p. 226) states that it occurs along the sea coast region from Florida to New Jersey.

***Chætocnema brunescens* Horn.**

This handsome little bronzed-brown species was swept from the sea-blite, *Batis maritima* L. on Hog Island, February 27, a dozen or more being taken. As pointed out by Horn* its peculiar colour and distinctly punctured head make it easily known. His types were taken by Schwarz at Key West (who also took a series at Punta Gorda) and we can find no other published record.

***Blapstinus aciculus*, sp. nov.**

Elongate-oval, feebly convex. Above piceous-black, very finely alutaceous, subopaque, sparsely clothed with minute prostrate brownish-yellow hairs; beneath piceous, legs and antennae dark reddish-brown. Head almost flat, finely, sparsely and evenly punctate, the clypeus broadly emarginate. Antennae gradually enlarged toward apex, second joint one-half the length of third, the latter slightly longer than fourth. Thorax subquadrate, one-fourth wider than long, sides subparallel from base to apical third, then gradually converging to the apical angles which are obtuse; hind angles rectangular, base feebly bisinuate; disc finely, evenly and rather sparsely aciculate punctate. Elytra at base but slightly wider than thorax, sides very feebly diverging to behind the middle, then broadly curved to apex; striae rather deep, their punctures fine and well separated; intervals convex, each with numerous minute punctures, each one of which bears a very fine hair. Under surface of abdomen finely and sparsely punctate, that of prosternum reticulate-punctate. Male with three basal joints of front tarsi rather widely dilated and spongy pubescent beneath, first three segments of abdomen widely and shallowly concave, the fifth with a broad, rounded concavity at middle. Length 4.5 mm.

Described from four males taken December 22-24 beneath dried cow dung in a sandy lane. Allied to *humilis* Casey, but body broader and form and sculpture of thorax, and secondary sexual characters very different. Specimens have been sub-

*Trans. Amer. Ent. Soc., XVI, 1889, 260.

mitted to Mr. Fall and Col. Casey, and both say it is unlike any species known to them.

***Arrhenoplita ferruginea* Lec.**

A colony of 20 or more adults of this interesting Tenebrionid were taken on Jan. 25 from a woody fungus on the side of an oak log. Larvæ and pupæ were also present. Described from Louisiana, Schwarz lists it as rare at Enterprise, Fla., in company with *Boletotherus bifurcus* Fab.

***Helops cisteloides* Germ.**

I can find no mention of this species in any of the published lists of Florida beetles. Horn in his "Tenebrionidæ"* gives the "Gulf States" as its habitat. About Dunedin it is quite frequent during the winter months, a score or more being taken from between the bundles of a stack of shingles, and others at porch light.

***Mycetochares puncticollis*, sp. nov.**

Elongate, slender, subparallel. Black, very sparsely clothed with a fine, prostrate, brownish-yellow pubescence; elytra each with a large oval reddish-yellow humeral spot; antennæ, labrum, tibiæ and tarsi pale brownish-yellow, femora and under surface piceous. Eyes rather large, separated by twice their width. Thorax nearly twice as wide as long, basal foveæ two, small; sides broadly curved, hind angles obtuse; surface, as well as that of head, finely, very densely and evenly punctate. Elytra as wide at base as thorax, disc without trace of striæ, very finely and closely rugosely punctate. Under surface minutely and sparsely punctate. Front coxæ separated by a prosternal process. Length 3.8 mm.

Described from a single specimen sifted from dead leaves, March 8. Allied to *fraterna* Say but differs from it and all other described species by the fine, dense punctuation of thorax. The pale spot of elytra is oblong-oval and confined to the humerus, whereas in *fraterna* it is much larger and placed obliquely between humerus and suture.

***Anthicus convexulus* Casey.**

Single specimens were swept from huckleberry on March 20 and April 8. Described from South Carolina.

*Trans. Amer. Phil. Soc., XIV, 1870, 936.

Eleminus ashmeadi Casey.

Four examples have been taken at Dunedin, February 23—April 11, by sweeping ferns in a wet hammock, and another at Sanford on March 28. The unique type of Casey was from St. Nicholas, Florida.

Zonantes schwarzi Casey.

A specimen of this well-marked, little Anthicid was beaten from the flowers of the Virginia willow, *Itea virginica* L., in a wet hammock on March 27. Only the type, described from Biscayne Bay, Fla., has heretofore been recorded. From Casey's description* the Dunedin specimen differs somewhat in colour, the median black bar of elytra being broken at the suture, while the legs are pale except the femora which are black at base.

Sandytes ptinoides Schz.

This species occurs on ferns and other foliage in wet hammocks. Two specimens have been taken near Dunedin, one December 17, the other March 12. It is recorded from New Smyrna and Enterprise by Schwarz as very rare.

Gnathium francilloni Kirby.

Four specimens taken by sweeping low vegetation along the margin of a pond, October 26. No previous published Florida record can be found.

Nemognathus nemorensis Hentz.

One specimen taken with the preceding. "Tampa, very rare," is Schwarz's record.

Nemognathus vittigera Lec.

Ft. Myers, Sarasota and Dunedin, one specimen from each locality; March 4-June 10; the one on the latter date at porch light, the others on flowers of thistle. Le Conte gives its range** as Illinois, Missouri and Texas.

Alloxaxis pleuralis Lec.

Six specimens at porch light; June 10-July 5.

Alloxaxis floridana Horn.

Also at porch light, nine specimens having been taken in June and July. It is very probable that this will prove to be only a

*Ann. N.Y. Acad. Sci., VIII, 1895, 783.

**Trans. Amer. Ent. Soc., VIII, 1880, 215.

pale variety of the preceding. Horn's unique type was from Biscayne Bay.

***Paraglyphus setosus* Blatch.**

This genus and species were founded* on a single specimen taken in the axils of a thistle on Hog Island. Especial attention was given to the search for additional examples during the past winter. On December 27, the first visit to that portion of the island where the type was found, more than 40 thistles were chopped up, and 71 examples of *Agraphus bellicus* Say taken from their axils, as well as a number of *Tanymecus lacæna* Hbst., but no *Paraglyphus*. On January 29 another trip was made. The two species mentioned were still found but in diminished numbers, and after a long search a single example of the *Paraglyphus* rewarded my efforts, so that now two are in my collection. Both the type and its mate were taken within 50 yards of one another, and within that distance of the Gulf beach on the western side of the island and about the middle of its length.

***Conotrachelus maritimus*, sp. nov.**

Oval, robust. Dark reddish-brown, vertex and elytra thinly clothed with short, scale-like prostrate reddish hairs; elytra each with a small spot of similar white hairs at the bases of the third and fifth intervals, and a minute tuft of mixed white and reddish scales near apex of third interval. Beak as long as thorax, male, as head and thorax, female, finely carinate above, striate on sides, coarsely and densely punctate. Thorax almost naked, bell-shaped, about as wide as long, sides broadly rounded, much narrowed in front, base bisinuate; disc with a trace of a very fine median carina, coarsely, very densely and deeply reticulate-punctate, each puncture enclosing a prostrate, oblong reddish scale. Elytra oval, nearly twice as wide at base as thorax, sides straight from base to middle, then strongly converging to the obtuse apex; striæ feebly impressed, each marked with a row of small, rounded punctures, each puncture partly closed by a prostrate, oblong scale; third, fifth and seventh intervals slightly elevated, all the intervals with a row of very short, erect black bristles, those on the declivity more evident and in part paler. Under surface and femora coarsely and densely punctate, each

*Rhynchophora of N. E. Amer., 1916, 110.

puncture scale-bearing like those of thorax. Femora armed with a small obtuse tooth; claws with a long acute one. Length 3.5-3.8 mm.

A compact and prettily marked little species, described from nine specimens taken singly or in pairs, February 17-22, beneath chunks of dead stems of saw palmetto along the borders of a thinly wooded tract one mile north of Dunedin, on the margin of Clearwater Bay. None of them were more than 50 feet from the edge of the water at high tide. The species belongs to Group III of the genus *Conotrachelus* as treated in the Rhynchophora of N. E. America. In some of the specimens the elytra are in part faintly mottled with minute patches of isolated white scales.

Anchonus duryi Blatch.

This peculiarly sculptured Cossonid was described* from specimens taken at Sarasota and West Palm Beach. It is also in the National Museum from St. Petersburg, 21 miles south of Dunedin. Single specimens were taken during the winter, January 24 and February 17, both under the same conditions and in the same locality as the *Conotrachelus* above described.

Since the second paper of this series appeared in the July Canadian Entomologist, Mr. E. A. Schwarz has called my attention to the fact that the name *Ischyrys tripunctatus* has been preoccupied by Crotch (1873) for a Santo Domingo species. The species I described under that name may, therefore, be known as *Ischyrys dunedinensis*.

Mr. Schwarz also cited me to a paper by H. G. Hubbard (Psyche, Vol. IV p. 215) on *Hypotrachia spissipes* Lec., in which the female is first described and the habits of both sexes given from specimens observed at Crescent City, Fla.

In addition to the localities given for *Chlorophorus annularis* Fab., Schwarz adds China, Japan and the Philippines, where it breeds in bamboo, a plant which has been introduced extensively in and about Dunedin. He states that; 'Unless the beetle becomes established in the bamboo debris wherever the plant is grown in this country, it should not be included in our lists.'

*Rhynchophora, p. 521.

LOUISIANA RECORDS OF THE BINDWEED PROMINENT.
(*SCHIZURA IPOMEÆ* DDY.)

BY E. S. TUCKER, STATE AGRICULTURAL EXPERIMENT STATION.

BATON ROUGE, LA.

Three specimens of a prominent caterpillar were collected on rose leaves, at the home of the writer in Baton Rouge, La., October 4, 1913. On being confined with the sprigs of the plant on which they fed for a while, one soon pupated in an oval cocoon covered with fragments of dried leaves. Another only succeeded in spinning a similar cocoon, as it died inside of the latter without pupating. The third failed entirely. Not until after a moth was found to have emerged from the first cocoon, on January 28, 1914, the adult then being somewhat rubbed but alive, could the species be positively identified. A critical study of the specimen led to the conclusion that it represented the bindweed prominent, *Schizura ipomeæ* Ddy. The larvæ had agreed as closely with figures of same stage of *Schizura unicornis* S. & A. as with that of the determined name, according to Packard's monograph.

Again at the same place on September 25, 1914, similar larvæ of medium size were taken while feeding on the rose leaves. These examples agreed more closely with Packard's figures of the bindweed prominent than with the unicorn prominent. They pupated about 10 days later, each in the same kind of cocoon as mentioned in the preceding case.

Slight attacks by what appeared to be the same species of caterpillar on pecan foliage came to the writer's attention while inspecting nursery stock at Ferriday, Concordia Parish, La., on September 16 of the latter year. Then under date of the 29th of the same month, a correspondent at Newroads, Pionte Coupee Parish, La., sent like specimens, complaining that the caterpillars were eating the foliage of his young pecan trees. He added, however, that only a few of his trees which had been set out during the preceding winter were attacked so far, and the insect seemed to prefer the less vigorous growth. In asking information about it, he desired to know if means of control would be necessary, and if so, what treatment would be advisable. For reply, the opinion was given that unless the insect became very numerous it could

August, 1917

hardly do much harm owing to the lateness of the season. In case its depredations should ever present a serious aspect, however, it could easily be poisoned with an arsenical spray.

On August 3, 1915, the writer once more recognized a partially grown caterpillar by its markings and form as the same species, this occurring on a rose bush of a florist's place at Hammond, Tangipahoa Parish, La. As the grower had made a practice of picking off and destroying all such enemies on his plants, he had kept his stock free from ravages.

An inquiry dated October 30 of the same year, which was received from Plaquemines, Iberville Parish, La., brought the species to further notice by referring to a specimen of worm which was destroying rose bushes. Inspection of the accompanying material revealed a partly grown caterpillar answering in all particulars to the bindweed prominent.

A NEW SPECIES OF PHENACOCOCCUS (HEMIPTERA, HOMOPTERA).

BY A. H. HOLLINGER, COLUMBIA, MO.

***Phenacoccus pettiti*, sp. nov.**

Eggs.—Apparently just deposited under the body of the adult female with only a few fine, white, waxy hairs to hold them together, but not enough to be called an ovisac; egg-shells white.

Young.—Lemon or straw-coloured, about 5 mm. long; ovoid with rather broadly rounded extremities; antennæ and legs pale yellow; antennæ about one-half the length of the body or the length of the transverse diameter of the body; very active; eyes blackish; apparently ventrally placed and far apart; a stout, white waxy spur arising from between the anal lobes.

Adult female.—About 2.5 mm. long and 1.3 mm. wide; oval-elliptical; somewhat truncate across the cephalic end; white, waxy exudation at the anal end; body slate-gray to brownish-gray; covered both dorsally and ventrally with a white secretion of waxy powder; on the dorsum laterad of the median line are two rows of abdominal and thoracic depressions which are lacking in secretion; lateral margins covered with abundant white, woolly, waxy secre-

tion, occurring also more or less abundantly over the dorsum, but especially noticeable in irregular longitudinal masses between the latero-medial rows of depressions on the dorsum, and also laterad of each row; a fringe of seventeen short, white, waxy spurs along

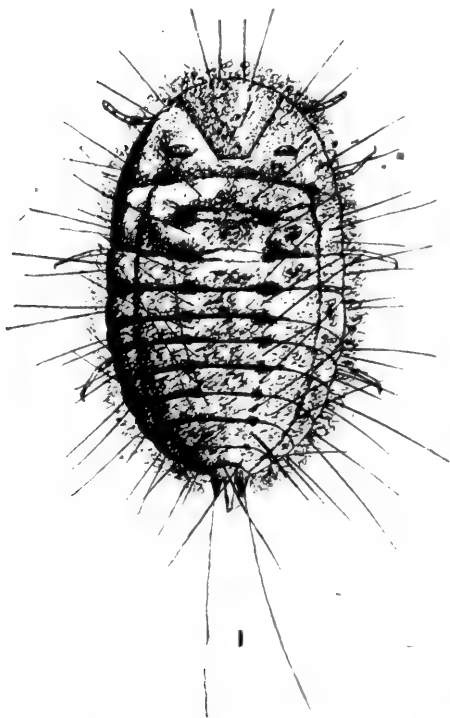


Fig. 24. — *Phenacoccus peltiti* n. sp., greatly enlarged. Note the two longitudinal rows of dorsal depressions and the long, waxy filaments.

either lateral margin of the body, the two caudal ones being the longest; entire dorsum bearing long, thin, silken, glass-like hairs, some of which are as long or longer than the insect; they break off very easily; but are soon replaced by new ones; iridescent; apparently arising from definite locations, for some of them are marginal, arising from about the middle of each segment while others are just anterior and posterior to each dorsal depression; apparently more in the caudal than in the cephalic region, as many as ten arising from the fourth segment from the anal end of one female; legs and antennæ pale brownish, when boiled in 10% KOH turns red-brown to brick-

red, but does not colour the solution.

Adult female mounted,—2.7 mm. long and 1.8 mm. wide; *derm* in cephalic region bearing numerous long and short body hairs, most numerous cephalad of the mouth-parts and between the basal segments of the abdomen; also with numerous short and long body hairs in proximity to the anal orifice; cerarius type of gland-pores scattered over the *derm*; several large gland-pores of the "circumgenital" type also near the anal opening; many large

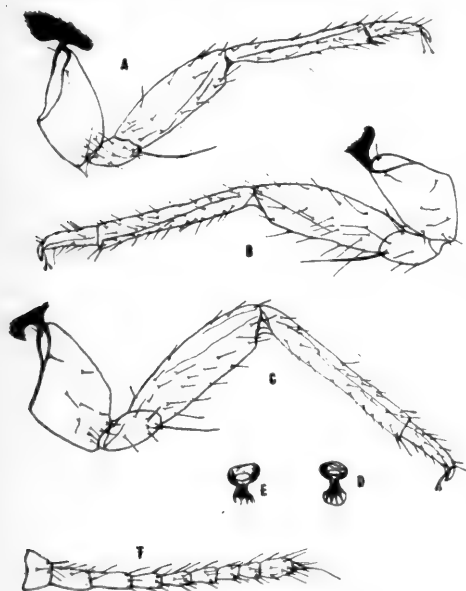


Fig 25.—*Phenacoccus pettiti* n. sp., A, fore leg; B, middle leg; C, hind leg; D, anterior spiracle; E, posterior spiracle; F, antenna.

body-glands near the margins of the body as well as a few scattered over the surface; these glands project above the derm, as in figure; legs and antennae very well developed, strongly chitinized, and with numerous long hairs; *antennal formulae* variable, as follows: 325946178, 32(59)46178, 3(92)5416(78), (23)9154678, (23)95146(78), 329514678, 329(154)678, 32-954(16)78, 329546178, 329-546187, 32945(61)78, 32945-1678, 3(29)51(46)78, 3(29)541678, 3925(16)478, 3(92)514678, and 3(29)5(146)78; antennal curves as in diagram, *leg measurements*

showing the extremes as follows:

	<i>Trochanter and Femur</i>	<i>Tibia</i>	<i>Tarsus</i>
Prothoracic leg.....	350 x 91	279 x 41	103 x 27
.....	368 x 94	309 x 35	121 x 32
Mesothoracic leg.....	376 x 94	320 x 38	115 x 32
.....	385 x 97	323 x 44	118 x 32
Metathoracic leg.....	412 x 94	368 x 47	118 x 32
.....	420 x 97	397 x 50	132 x 32

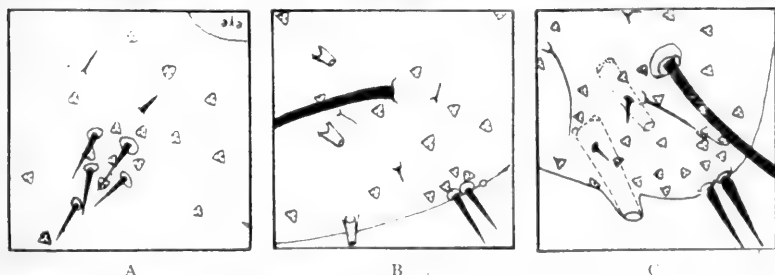


Fig. 26.—*Phenacoccus pettiti* n. sp., A, cerarius of anal lobe on ultimate segment; B, cerarius of penultimate segment; C, second head cerarius.

Tarsal claws 32 mm. long; tibial spines vary from 20 mm. to 30 mm. in length; trochanteral spine varies from 118 mm. to 147 mm. long, being of constant length in each specimen; *spiracles* large and Sclerotinia-shaped; *anal lobes* slightly developed, well rounded on the distal ends, and each bearing a seta or hair varying from 265 mm. to 295 mm. in length; also bearing several other hairs of varying lengths, from very minute (about 5 mm.) to longer ones (45 mm. to 90 mm.); also bearing cerarii composed of two stout, conical spines, surrounded by several small, obscurely-triangular wax pores; also bearing four large gland-pores, two on each lobe, and about 20 mm. in diameter,

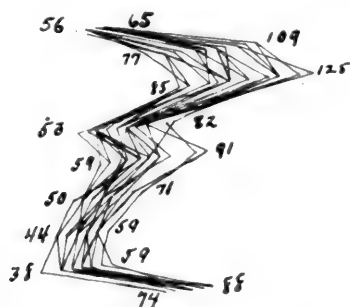


Fig. 27.—Antennal curves of *Phenacoccus pettiti* n. sp.

from which lead cylindrical tubes; *cerarii* distinct and somewhat elevated upon rounded protuberances; *cerarii* of the ultimate and penultimate segments and the second head group as in figures.

Type locality.—Vicinity of Columbia, Boone County, Mo.

Remarks.—The writer names this species in honour of Professor Pettit, Entomologist of the Michigan Agricultural Experiment Station. It has been found in the act of feeding on *Ambrosia trifida*, *Psedera quinquefolia*, *Rhus toxicodendron*, *Cercis canadensis*, *Symphoricarpos orbiculatus*, and *Fraxinus americana*. It was collected from *Celtis occidentalis*, *Carya ovata*, *Ostrya virginiana*, and *Acer saccharum* upon which it was merely crawling. It is distributed in Missouri in Gentry, Jackson and Boone counties, and it has been reported to the writer from Kansas. The characteristic dorsum of this species will distinguish it in the field while mounted specimens show many distinguishing characters, most important of which are the projecting glands in the anal lobes.

NOTES ON NEBRASKA BEMBICINÆ.

BY CLARENCE E. MICKEL, LINCOLN, NEBRASKA.

Recently the writer worked over the material of the sub-family Bembicinæ in the entomological collection of the University of Nebraska. In view of the fact that there seems to be very little Nebraska material of this sub-family in other entomological collections and since a monograph of the Bembicinæ has lately appeared, the time seems opportune to publish a list of the Nebraska species. Some notes on synonymy are also included.

Genus STICTIELLA Parker.

Stictiella pictifrons (F. Smith).

Specimens examined: 2 ♀'s. Omaha, 1; Weeping Water, 1. July.

Stictiella plana (Fox).

Specimens examined: 3 ♀'s, 4 ♂'s. McCook, 1; Halsey, 3; Mitchell, 2; Glen, 1. July 10 to August 15.

Stictiella emarginata (Cresson).

Specimens examined: 4 ♀'s, 4 ♂'s. South Sioux City, 1; Maskell, 2; Mitchell, 1; Warbonnet Canyon, 4. June 28 to July 24.

Stictiella speciosa (Cresson).

Specimens examined: 6 ♀'s. Haigler, 1; Sidney, 4; Mitchell, 1. August.

Stictiella spinifera (Mickel).

1916, *Stictia spinifera* Mickel, Trans. Amer. Ent. Soc., XLII, p. 418, ♂.

1917, *Stictiella melampous* Parker, Proc. U. S. Nat. Mus., LII, p. 43, ♂.

The writer has carefully compared the type of *spinifera* with the description and figures of *melampous* published by Mr. Parker, and finds *melampous* to be identical with *spinifera*.

Specimens examined: 3 ♂'s. McCook, 2; Glen, 1. July, August.

Stictiella exigua (Fox.)

Specimens examined: 6 ♀'s, 2 ♂'s. Glen, 7; Warbonnet Canyon, 1. July 12 to August 17.

Stictiella divergens Parker.

1917, *Stictiella divergens* Parker, Proc. U. S. Nat. Mus., LII, p. 55, ♂.

August, 1917

Attention should be called to the fact that *Stictiella exigua* Mickel, ♂ (Trans. Amer. Ent. Soc., XLII, p. 419) is the same as *divergens*. However, Mr. Parker has assigned another male to *exigua* in his monograph. Biological evidence is needed to show which of these is really the male of *exigua* and to determine the status of the name *divergens*.

Genus BICYRTES Lepeletier.

Bicyrtes fodiens (Handlirsch).

Specimens examined: 1 ♀, 1 ♂. Louisville, 1; Meadow, 1. July.

Bicyrtes ventralis (Say).

Specimens examined: 12 ♀'s, 31 ♂'s, Nebraska City, 1; Omaha, 8; South Bend, 3; Lincoln, 2; Cedar Bluffs, 2; Neligh, 1; Carns, 3; Halsey, 1; Mitchell, 12; Gordon, 1; Glen, 8; Monroe Canyon, 1; Warbonnet Canyon, 1. June 25 to September 27.

Bicyrtes quadrifasciata (Say).

Specimens examined: 9 ♀'s, 16 ♂'s. Omaha, 14; Louisville, 8; South Bend, 1; Meadow, 1; Haigler, 1. July 4 to September 12.

Bicyrtes capnoptera (Handlirsch).

Specimens examined: 5 ♀'s, 2 ♂'s. Mitchell, 7. July 20 to September 4.

Genus BEMBIX Fabricius.

Bembix arcuata Parker.

Specimens examined: 3 ♂'s. Meadow, 3. July.

Bembix nubilipennis Cresson.

Specimens examined: 31 ♀'s, 5 ♂'s. Omaha, 5; Louisville, 3; Lincoln, 23; Fairmont, 2; Holdrege, 1; Culbertson, 1. July 9 to September 8.

Bembix sayi Cresson.

Specimens examined: 8 ♀'s, 19 ♂'s. Lincoln, 3; Fairmont, 1; Haigler, 2; Imperial, 4; North Platte, 1; Halsey, 1; Mitchell, 15. June 22 to August 17.

Bembix belfragei Cresson.

Specimens examined: 3 ♀'s, 3 ♂'s. Omaha, 1; West Point, 1; McCook, 2; Haigler, 1; Halsey, 1. June to August.

Bembix spinolæ Lepeletier.

Specimens examined: 219 ♀'s. Child's Point, 2; Omaha, 47; Louisville, 19; Lincoln, 16; Fairmont, 7; Cedar Bluffs, 1; South

Sioux City, 4; Niobrara, 1; Norfolk, 1; Neligh, 1; Red Cloud, 3; McCook, 1; Haigler, 3; Halsey, 5; Valentine, 2; Mitchell, 86; Glen, 12; Harrison, 3; Monroe Canyon, 5. June 18 to October 11.

Bembix primaestate Johnson and Rohwer.

Specimens examined: 12 ♀'s. Mitchell, 5; Glen, 5; Monroe Canyon, 1; Warbonnet Canyon, 1. July 11 to August 14.

Bembix pruinosa Fox.

Specimens examined: 11 ♀'s, 6 ♂'s. Child's Point, 1; Omaha, 6; Louisville, 2; South Bend, 1; Ashland, 5; Neligh, 2. July 2 to September 3.

Genus MICROBEMBIX Patton.

Microbembix monodonta (Say).

Specimens examined: 51 ♀'s, 23 ♂'s. Omaha, 15; Louisville, 5; South Bend, 13; Ashland, 27; Lincoln, 2; West Point, 2; Neligh, 3; Haigler, 1; Halsey, 1; Mitchell, 3; Gordon Creek, 1. June 18 to September 30.

A NEW SPECIES OF AGRILUS FROM CALIFORNIA.*

BY W. S. FISHER, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

Among a collection of Buprestidæ, submitted by Mr. H. E. Burke for determinations, a large series of the following species was found, which has been confused in collections with *Agrilus politus* Say, and the description is presented at the present time, so that the name can be made available for discussing this species in economic papers.

Agrilus burkei, n. sp.

Form of *politus*, of a deep blue to bluish-green colour and moderately shining. Antennæ of a uniform blue or bluish-green throughout, rather short, not reaching to the middle of the prothorax, serrate from the fourth joint. Head nearly flat in front, with a shallow, transverse groove at base of clypeus, terminating in a deep pit just above the base of the antennæ, a feeble median depression reaching from the occiput to near the middle of the front; front coarsely granulate, sparsely clothed with short, white pubescence; occiput strigose. Prothorax wider than long, narrower at base than apex; sides arcuate, feebly sinuate near the posterior

*Contribution from the Branch of Forest Insects, Bureau of Entomology.
August, 1917

angles, which are carinate in both sexes, sinuous when viewed laterally; disc convex with two shallow, median depressions, one near the base and the other near apex, and with deep, prominent lateral depressions; surface coarsely, transversely rugose, with fine, indistinct punctures between the strigæ. Scutellum transversely carinate, surface very finely granulate. Elytra slightly sinuate behind the humeri, dilated behind the middle, and slightly sinuate near the apex, which are separately rounded and serrulate; disc slightly flattened, basal impressions large and deep, reaching from the scutellum to humerus, surface closely imbricate-granulate, without any trace of costæ. Body beneath of same colour as above but more shining, finely, transversely strigose, and sparsely clothed with fine, short, white pubescence; prosternal lobe slightly emarginate; intercoxal process broad, slightly narrowing to apex. Pygidium without a projecting carina. First joint of hind tarsi as long as the next three joints united. Length 6-9 mm.; width 1.75-2.50 mm.

Male.—Front densely punctured and pubescent. Prosternum densely punctured and hairy. Claws of anterior and middle feet cleft near the apex, nearly bifid; posterior claws cleft at middle, forming a broad tooth.

Female.—Front more shining and less densely pubescent. Prosternum sparsely pubescent. Claws of all feet cleft at middle, forming a tooth.

Habitat.—Placerville, California.

Type, allotype and paratypes.—Cat. No. 21386, U. S. N. M.

Described from a large series of specimens recorded under various Bureau of Entomology, Hopk. U. S. Numbers. These specimens have been reared by Mr. H. E. Burke from material collected at various times by himself, J. J. Sullivan and F. B. Herbert. The larvæ of this species mine in the inner bark and wood of normal, injured, and dying white alder (*Alnus rhombifolia*), and paperleaf alder (*Alnus tenuifolia*).

This species is closely allied to *pólitus* but differs from it chiefly in colour and habits. Horn in his Revision of the genus *Agilus* (Trans. Amer. Ent. Soc., XVIII, p. 316, 1891) places all the brassy green or blue forms under LeConte's name *desertus*, which is preoccupied and which has been renamed *solitarius* by

Harold (Col. Hefte, vol. V, p. 124, 1869). LeConte in the original description, does not mention a blue form, but gives the colour as "æneus subnitidus." Horn in the above Revision places all of these forms as synonyms of *politus* Say, in which he says, "The difference of colour has given rise to several names which do not seem worthy of retention, even as varietal names, inasmuch as the intergrading of colour is so gradual as to render it impossible to separate them." At the time Horn wrote his paper on this genus very little was known of their food habits, but as the habits of these insects become better known, and where large series have been reared, the colour seems to be quite constant, so it will be necessary to restore some of the old names.

TOM WILSON.

In the full vigour of his energetic life and while carrying out his duties as Inspector of Indian orchards, Mr. Tom Wilson was burnt to death on March 6th, 1917, when the Quahalla Hotel at Hope, B.C., was totally destroyed by fire.

Few men were more widely known or more universally liked in British Columbia than Tom Wilson, whose extensive knowledge of the natural history of the province, and particularly of the flora, was at the service of all students and nature lovers.

He was born at Mussleburgh, Scotland, on July 25th, 1856. As a young man he learned horticulture and forestry, and at the age of 22 was Foreman in the Royal Botanic Gardens, Edinburgh. Two years later he went to India where he spent six years. Repeated attacks of fever compelled him to return to Scotland, but in 1885, a few months after his return, he came to Canada. After a varied experience in railroad construction, farming and orchard planting he reached Vancouver, B.C., in 1896, and later was appointed as Fruit Inspector in the Provincial Department of Agriculture. In 1900 he was appointed Superintendent of Fumigation at Vancouver, B.C., by the Dominion Government, and in 1906 additional duties as Inspector of Indian Orchards were assigned to him. In 1911 he was relieved of his duties as Superintendent of Fumigation in order that he might devote his entire time to the work in the Indian orchards, an important section of the work of the Entomological Branch. To this work he devoted himself

wholeheartedly. At first his duties consisted in cleansing the Indian orchards, or one might say with greater exactness, the fruit trees on the Indian reserves in British Columbia. From this the work developed under his guidance until the Indians were not only growing excellent fruit but were learning to pack their fruit in the approved fashion, and in many reserves young orchards were being planted. Mr. Wilson wrote an account of the work in the Indian orchards in *The Agricultural Gazette of Canada*, October, 1916. (Vol. 3, No. 6, pp. 856-860.) The Indians and those gentle Sisters who teach the Indian children will miss him.

During his thirty odd years in British Columbia he acquired an extraordinary knowledge of the trees, plants and insects of the province, and long before the establishment of ecology as a special study he had especially interested himself in questions relating to plant distribution and association. He was always connected with the promotion of entomological work in British Columbia, and in 1912 was President of the Entomological Society of British Columbia, to the *Proceedings* of which he contributed papers from time to time. In conjunction with his friend A. H. Bush he made an excellent collection of the insects of British Columbia, and last year, after the death of his old friend on military service in France, he presented the collection to the Entomological Branch, where it now forms part of the Canadian national collection of insects.

He occupied a unique place in the small band of workers in British Columbia. His memory and his hands were at the service of all students of the subjects that he himself so diligently studied. Mountain, forest and the open country were his laboratory, and a journey in his company was a delightful experience. Nothing escaped his attention, and one felt the refreshing effect of a mind that had been stored in the open. His sister, in a recent letter to me, writes: "He enjoyed life so thoroughly lately, was so wholehearted in his pursuits that one did not think of him as in his 62nd year. His splendid constitution, the open air life and the intense love of his work, together with the close touch with nature, all combined to make the years pass lightly. . . ." His tragic death has removed a keen student of nature, a staunch friend and a faithful servant of the State.

C. GORDON HEWITT.

CLEANING BUMBLE-BEES.

Recently, when looking over some back numbers of the CAN. ENT. I came across Mr. Sladen's article on page 116 of vol. XLV, 1913, entitled "Bumble-Bees and Wasps Wanted," and noticed that in the second paragraph he says that "crushed tissue paper should be placed in the cyanide jar to absorb moisture which would otherwise mat and spoil the bees." As I have had some experience in the matter I thought perhaps a cure for this trouble might be of sufficient interest to warrant publication. Several years ago I visited a peach orchard in full bloom, and swarming with bumble-bees. I caught a nice lot of them and took them home, and when I came to pin them out I found that they were all as wet as the traditional "drowned rat," and apparently ruined. I decided to experiment with them; they couldn't be made to look any worse any way and perhaps might be bettered. I took a good-sized bottle with a wide mouth, filled it about half full of water, dumped the bees into it, corked it tightly, and shook it violently for several minutes. I then poured off the water and poured in more and shook again, repeating the process until the water-seemed perfectly clean. I then spread the bees out on blotting paper and left them for a few minutes to get rid of the excess of the water, then put them back into the bottle and covered them with denatured alcohol, letting them stand until I thought the alcohol had had time to unite with the water, (perhaps 15 minutes) and then removed them again to fresh blotters to get rid of most of the alcohol, after which I again returned them to the bottle and flooded them with gasoline. After a few minutes in this bath they were again placed on blotting paper, and in a few minutes the gasoline all evaporated, and the bees were as fresh and clean as though never wet; cleaner in fact, for often fresh specimens are badly daubed with honey on the face and head. Possibly the last bath might not have been necessary, but it made them dry quicker. The same process would, I think, be equally successful in cleaning moths which have been drowned in sap buckets, only, of course, they should not be shaken in a bottle, but floated on a pan of water and moved around carefully to get rid of the sugar, just as the bees are freed of the regurgitated honey which is the cause of their being wet and sticky. E. J. SMITH, Sherborn, Mass.

BOOK NOTICE.

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF NOVA SCOTIA
FOR 1916. No. 2, January, 1917.

The Entomological Society of Nova Scotia deserves great credit for the admirable work it has already accomplished in the short period since it came into being. We have recently received a copy of vol. II of the Proceedings of the Society, containing the papers and addresses presented at the Annual Meeting, which was held at Truro on August 4, 1916. This is a publication of 64 pages, and contains in addition to excellent addresses by the President, Mr. E. C. Allen, and the Superintendent of Education, Dr. A. H. MacKay, thirteen papers on entomological subjects by various members of the Society. Of these papers no less than five are contributions from the Society's indefatigable Secretary-Treasurer, Prof. W. H. Brittain, the Provincial Entomologist, while two more are by the same author in collaboration with others. Mr. G. E. Sanders, of the Dominion Entomological Laboratory, Annapolis Royal, contributes four papers, including one in collaboration with Prof. Brittain.

The list of papers in addition to official reports and addresses is as follows:

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Mailed August 1st, 1917.

Harold (Col. Hefte, vol. V, p. 124, 1869). LeCointe in the original description, does not mention a blue form, but gives the colour as "æneus subnitidus." Horn in the above Revision places all of these forms as synonyms of *politus* Say, in which he says, "The difference of colour has given rise to several names which do not seem worthy of retention, even as varietal names, inasmuch as the intergrading of colour is so gradual as to render it impossible to separate them." At the time Horn wrote his paper on this genus very little was known of their food habits, but as the habits of these insects become better known, and where large series have been reared, the colour seems to be quite constant, so it will be necessary to restore some of the old names.

TOM WILSON.

In the full vigour of his energetic life and while carrying out his duties as Inspector of Indian orchards, Mr. Tom Wilson was burnt to death on March 6th, 1917, when the Quahalla Hotel at Hope, B.C., was totally destroyed by fire.

Few men were more widely known or more universally liked in British Columbia than Tom Wilson, whose extensive knowledge of the natural history of the province, and particularly of the flora, was at the service of all students and nature lovers.

He was born at Mussleburgh, Scotland, on July 25th, 1856. As a young man he learned horticulture and forestry, and at the age of 22 was Foreman in the Royal Botanic Gardens, Edinburgh. Two years later he went to India where he spent six years. Repeated attacks of fever compelled him to return to Scotland, but in 1885, a few months after his return, he came to Canada. After a varied experience in railroad construction, farming and orchard planting he reached Vancouver, B.C., in 1896, and later was appointed as Fruit Inspector in the Provincial Department of Agriculture. In 1900 he was appointed Superintendent of Fumigation at Vancouver, B.C., by the Dominion Government, and in 1906 additional duties as Inspector of Indian Orchards were assigned to him. In 1911 he was relieved of his duties as Superintendent of Fumigation in order that he might devote his entire time to the work in the Indian orchards, an important section of the work of the Entomological Branch. To this work he devoted himself

wholeheartedly. At first his duties consisted in cleansing the Indian orchards, or one might say with greater exactness, the fruit trees on the Indian reserves in British Columbia. From this the work developed under his guidance until the Indians were not only growing excellent fruit but were learning to pack their fruit in the approved fashion, and in many reserves young orchards were being planted. Mr. Wilson wrote an account of the work in the Indian orchards in *The Agricultural Gazette of Canada*, October, 1916. (Vol. 3, No. 6, pp. 856-860.) The Indians and those gentle Sisters who teach the Indian children will miss him.

During his thirty odd years in British Columbia he acquired an extraordinary knowledge of the trees, plants and insects of the province, and long before the establishment of ecology as a special study he had especially interested himself in questions relating to plant distribution and association. He was always connected with the promotion of entomological work in British Columbia, and in 1912 was President of the Entomological Society of British Columbia, to the *Proceedings* of which he contributed papers from time to time. In conjunction with his friend A. H. Bush he made an excellent collection of the insects of British Columbia, and last year, after the death of his old friend on military service in France, he presented the collection to the Entomological Branch, where it now forms part of the Canadian national collection of insects.

He occupied a unique place in the small band of workers in British Columbia. His memory and his hands were at the service of all students of the subjects that he himself so diligently studied. Mountain, forest and the open country were his laboratory, and a journey in his company was a delightful experience. Nothing escaped his attention, and one felt the refreshing effect of a mind that had been stored in the open. His sister, in a recent letter to me, writes: "He enjoyed life so thoroughly lately, was so wholehearted in his pursuits that one did not think of him as in his 62nd year. His splendid constitution, the open air life and the intense love of his work, together with the close touch with nature, all combined to make the years pass lightly. . . ." His tragic death has removed a keen student of nature, a staunch friend and a faithful servant of the State.

C. GORDON HEWITT.

CLEANING BUMBLE-BEES.

Recently, when looking over some back numbers of the CAN. ENT. I came across Mr. Sladen's article on page 116 of vol. XLV, 1913, entitled "Bumble-Bees and Wasps Wanted," and noticed that in the second paragraph he says that "crushed tissue paper should be placed in the cyanide jar to absorb moisture which would otherwise mat and spoil the bees." As I have had some experience in the matter I thought perhaps a cure for this trouble might be of sufficient interest to warrant publication. Several years ago I visited a peach orchard in full bloom, and swarming with bumble-bees. I caught a nice lot of them and took them home, and when I came to pin them out I found that they were all as wet as the traditional "drowned rat," and apparently ruined. I decided to experiment with them; they couldn't be made to look any worse any way and perhaps might be bettered. I took a good-sized bottle with a wide mouth, filled it about half full of water, dumped the bees into it, corked it tightly, and shook it violently for several minutes. I then poured off the water and poured in more and shook again, repeating the process until the water seemed perfectly clean. I then spread the bees out on blotting paper and left them for a few minutes to get rid of the excess of the water, then put them back into the bottle and covered them with denatured alcohol, letting them stand until I thought the alcohol had had time to unite with the water. (perhaps 15 minutes) and then removed them again to fresh blotters to get rid of most of the alcohol, after which I again returned them to the bottle and flooded them with gasoline. After a few minutes in this bath they were again placed on blotting paper, and in a few minutes the gasoline all evaporated, and the bees were as fresh and clean as though never wet; cleaner in fact, for often fresh specimens are badly daubed with honey on the face and head. Possibly the last bath might not have been necessary, but it made them dry quicker. The same process would, I think, be equally successful in cleaning moths which have been drowned in sap buckets, only, of course, they should not be shaken in a bottle, but floated on a pan of water and moved around carefully to get rid of the sugar, just as the bees are freed of the regurgitated honey which is the cause of their being wet and sticky. E. J. SMITH, Sherborn, Mass.

BOOK NOTICE.

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF NOVA SCOTIA
FOR 1916. No. 2, January, 1917.

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Mailed August 1st, 1917.





SOME RECENT IMMIGRANTS INTO NEW JERSEY.
(See page 293.)

The Canadian Entomologist.

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No. 9

POPULAR AND PRACTICAL ENTOMOLOGY.

UNDESIRABLE INSECT IMMIGRATION INTO NEW JERSEY.

BY HARRY B. WEISS, NEW JERSEY DEPARTMENT OF AGRICULTURE,
NEW BRUNSWICK, N.J.

From Europe, Asia and South America, a more or less constant stream of such undesirables arrives and settles in New Jersey. This State by reason of certain specialized agricultural activities, receives more than other States, but what is happening in New Jersey is happening to a less extent in other States. This emigration is not due to the pressure of over-population at home, nor to the pursuit of wealth, nor to political, social or religious discontent. It is rather an involuntary emigration or one of which the participants are wholly unconscious.

European officials try to keep them at home because they know that the United States does not want them, and a small army of inspectors on this side of the water is constantly on the watch for them, ready to turn them back if discovered; but in spite of the combined efforts of these officials, in spite of legislation against them, rules, regulations and so forth, some of these creatures contrive to slip through silently and unobserved, remaining so until later when their unwelcome activities are forced upon the community where they have settled.

On account of the similarity between the climate of this country and the northern parts of Europe and Asia and by reason of other similar conditions, many of these emigrants do very well in this country, especially when allowed to develop to their fullest extent unhampered by enemies and restrictions. One which is comparatively unimportant in its own country may become a serious menace when placed under new and favourable conditions. Fully one-half of the principal injurious hexapods in the United States have been introduced from foreign countries and the injuries inflicted by them have been enormous, in many cases beyond

reasonable calculation. In order to arrive at a better understanding of the facts surrounding these immigrants, a few cases are taken up in detail.

The Case of *Gryllotalpa gryllotalpa* (L.).

(Pl. XIV, fig. 2).

The Mole Cricket, *Gryllotalpa gryllotalpa* (L.), came to New Jersey from Holland, where with other members of her species, she occupied her time excavating tunnels through the soil, feeding on insect larvæ, cutting off plant roots in her path, raising a large family of children, eating them when other food was scarce, and incidently making a nuisance of herself to Holland agriculturists. One day while she and her husband were resting in a tunnel beneath a rhododendron growing in a nursery, the plant was suddenly dug up and before they could run, they found themselves imprisoned by a piece of burlap wrapped around the roots. Too frightened to try to escape, they dug a passageway for themselves in the closely packed soil and awaited developments.

This plant together with others was placed in a huge box which was floated down a canal in a flat-bottomed barge until an ocean-going steamer was reached. Here it was loaded none too gently into the hold of the vessel, which in due time docked at Hoboken, New Jersey. Following this, the case was loaded on a freight car and finally reached its destination in that state. Here the plant was removed, the burlap around the roots loosened, and the whole thing planted. Finding themselves free at last, Mr. and Mrs. *Gryllotalpa* crawled out to investigate and found conditions pretty much the same as they had been before their rough experience. So these two "shanghaied" creatures started a sub-way right then and there, and in due time raised another family. During the next few years they flourished exceedingly well, increasing in numbers by leaps and bounds, and finally cutting off so many roots that the plants wilted and died and the owner called in an entomologist to suggest a remedy.

And so ends the case of *Gryllotalpa*. Of course, the plants were officially inspected before the owner was allowed to plant them, but the inspector never thought of looking in the soil around the roots. If he did, he decided that it was not practical on ac-

count of the length of time necessary for such an operation, or because of the fact that the roots of the rhododendron were so fine and fibrous and so imbedded in the soil that it would be impossible to separate them and have anything left that would grow.

Some persons say that *Gryllotalpa* will never amount to much in New Jersey, which may be true, but what is to prevent her from being carried to other parts of the United States just as she was brought to New Jersey? Anyhow, she has a bad reputation in Europe.

The Case of *Blaberus discoidalis*.

(Pl. XIV, fig. 1).

Just like *Gryllotalpa*, the large Cockroach, *Blaberus*, came to New Jersey in a boat, but in this case, the boat sailed from a South American port instead of an European one. This boat carried among other things, numerous cases of wild orchids, which were consigned to a New Jersey orchid grower. It is somewhat difficult to determine just when *Blaberus* and his associates crawled into these cases and why they wanted to come to New Jersey. Perhaps they were chasing each other around the boxes while they stood on the dock of a South American port and a few dodged in to hide and were later carried on board. Perhaps they were already on the ship and crawled in the boxes for green food or want of something better to do or in search of amusement. However, these cases of orchids finally stood outside of a greenhouse in New Jersey waiting to be unpacked. This work was done outside so that *Blaberus* could not get into the house and thrive.

The official inspector was there also but *Blaberus* knew naught of inspectors and regulations and when the plant in which he was hiding was picked up, quick as a flash he dropped to the ground and scooted off. The greenhouse man said, "Well he will die just as soon as the weather gets cold, anyhow." Did he? Well, I guess not. Just as if an intelligent roach couldn't find a crack in a greenhouse, large enough to squeeze through. Then the inspector pulled out a little red book and marked down therein, "*Blaberus discoidalis* on orchids from South America." And that is all, except that *Blaberus* and others of his kind are doing very well now in New Jersey greenhouses. Of course, they are almost

omnivorous, are annoying, disgusting and troublesome, but still they don't bite the eyelashes off sleeping children here as they do in parts of Brazil, and that is something in their favour.

The Case of *Stephanitis pyrioides*.

It's a long distance from "cherry blossom" land to New Jersey, but the embryonic children of *Pyrioides* managed to make the trip in safety. *Stephanitis pyrioides* lived contentedly in Japan, on an azalea, sipping the sap now and then, watching over her brood, and taking pride in her beautiful, lace-like gauzy wings. Knowing upon the approach of cold weather, that she could not hope to live much longer, she carefully deposited in the leaves of the plant, close to the mid-ribs, tiny, oval eggs and then died contentedly. If this plant had only remained in Japan, all would have been well. But, there arose in New Jersey, a demand for Japanese azaleas, a demand which had to be supplied and so over the Pacific ocean, over the continent of North America, came the azaleas and the unborn children of *Stephanitis*. The inspector was on the watch for these plants and looked carefully over each one, but how was he to know of the tiny eggs hidden in the leaf tissue so effectually and not discoverable without a high-power microscope. He carried only a pocket lens, moreover he couldn't begin to pick off every leaf and tear it apart to see if anything was inside. The plants looked all right and so they were admitted.

And so the babies of *Stephanitis* grew up in New Jersey instead of Japan. Needless to say, they increased numerically to such an extent and made such a pest of themselves by sucking the sap out of nice, green, azalea leaves, that many owners of Japanese azaleas are forced every year to go through their gardens and squirt stuff on them with a little brass gun.

The Case of *Cholus forbésii*.

• (Pl. XIV, fig. 3).

There lived in the tropical forests of Colombia, an attractive black and white-marked creature, which prowled around, sinking its beak into the leaves and bulbs of wild orchids growing on the trunks of trees, living a care-free life, unknown and unhonoured.

Some of the plants upon which it had bestowed its attention were later ripped from the trees by natives with long, sharp knives; and in the course of time finally came to grace the conservatory of a person whose æsthetic taste demanded orchids. It was only a question of time before *Cholus* made her appearance and started to feed on the scenery in that conservatory. It appears that she had smuggled either herself or her young along with the plants, undoubtedly in the tissue, which the inspector could not examine without destroying the plant, and in that way arrived safely at her destination.

Of course, the tropical atmosphere of a greenhouse does not approach that of her natural home but it is a fair substitute, and she can be contented provided the owner does not devote his attention to her extermination.

The foregoing cases, and it would be possible to cite numerous other ones, show how the insect fauna of New Jersey and other States is constantly being added to by undesirables from other countries. This immigration is taking place in spite of well-developed and well-enforced systems of inspection. The establishment of foreign pests in the United States is not always due to a laxity in the inspection service of any state. In most cases, the pests have entered undetected by the inspector, sometimes through his ignorance of foreign pests, sometimes on account of individual carelessness, but mostly on account of the impossibility of examining every leaf, twig, root and particle of soil around the roots of a plant and having anything left that will grow, especially when an inspector is called upon to examine hundreds of plants each day.

In other words, ordinary inspection will not keep out all foreign pests, and extraordinary inspection would not be tolerated by importing firms or paid for by state governments. The inspection does, however, prevent an overwhelming rush of such pests; it does hold and delay the spread of them at times until means of controlling them have been found or until they are no longer dangerous, and it has in the past served the country well; but it is useless to expect more from inspection however well carried out it may be.

The fact remains that by the importation of plants from foreign countries (64,652 cases were brought into the U. S. during the season of 1915-16, according to the report of the Fed. Hort. Bd. for year ending June 30, 1916) we are slowly but surely adding to the number of pests which we already have in this country, thereby increasing the burden which future generations will have to bear. And the remedy? A national quarantine of all foreign nursery stock.

EXPLANATION OF PLATE XIV.

Fig. 1, *Blaberus discoidalis*, a tropical roach (natural size).

Fig. 2, *Gryllotalpa gryllotalpa*, the European mole cricket (natural size.)

Fig. 3, *Cholus forbesii*, a tropical orchid weevil, (after H. S. Barber), (enlarged).

LECTOTYPES OF THE SPECIES OF HYMENOPTERA (EXCEPT APOIDEA) DESCRIBED BY ABBÉ PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

Introduction.

This paper, which is a contribution from the Branch of Cereal and Forage Insects and the Branch of Forest Insects, is largely based on an examination made in May and June, 1915, of the Provancher collections located in the Museum of Public Instruction at Quebec, and in the possession of Mr. W. Hague Harrington and the Department of Agriculture at Ottawa, Canada.

This study was undertaken in order to determine in so far as possible the correct position of the Provancher species in the modern classification and obtain notes which would supplement the original descriptions, and thus facilitate recognition of the species, many of which could not be certainly identified by the original description. Notes of greater or less extent were obtained on all but a few of the species of Hymenoptera, excluding the Apoidea, especial stress being laid, however, upon the sawflies and the parasitic forms belonging to the Ichneumonoidea. In some groups our notes consisted principally of a record of the

September, 1917

condition of the type. The limited time at our disposal made it impossible to attempt to secure full notes on any but the groups in which we were especially interested.

This paper is only a list of the species described by Provancher with the location, condition and designation of the type specimens, and is submitted at this time in order to establish definite premises on which to work and thus make it possible to publish in the future, systematic notes on the species with assurance that other workers will be able to use our remarks and find the same specimens we examined.

The only previous comprehensive study of the Provancher collections was made by Mr. G. C. Davis, who has published the results of his study in two reports†. Davis, however, confined himself entirely to the Ichneumonidæ. The conclusions reached by him regarding the species, in the main, agree with our own, but in a number of instances do not coincide with ours. Davis made no attempt to establish lectotypes for the species, and, therefore, it was often impossible for us to determine on what specimen he based his conclusion.

Provancher's Life and Work.

Practically the first Canadian and in fact one of the first Americans to make a serious and comprehensive study of the Hymenoptera of Canada was Abbé Léon Provancher. Abbé Provancher was a French Canadian who was born, brought up and spent most of his life in the Province of Quebec. He died in 1892, and brief accounts of his life and work were afterward published in a number of journals.* Some years later Abbé Huard began a more extended biography which appeared in various issues of *Le Naturaliste Canadien*,** a magazine founded and edited, until shortly before his death, by Provancher. Since Provancher

†Some notes from a Study of the Provancher Collection of Ichneumonidæ, 1894, Proc. Acad. Nat. Sc. Phil., pp. 184-190.

Review of a few more Provancher types of Ichneumonidæ, 1895, Can. Ent., pp. 287-290.

*See especially Can. Ent., Vol. 24, 1892, pp. 130-131, and Entom. News, Vol. 6, 1895, p. 209, pl. IX.

**This interesting account has never been completed, but Abbé Huard told us it was his intention to complete it and we certainly hope he finds an opportunity to do so. For the parts published, see Nat. Can., 1894, 1895, 1896, 1897, 1898.

began his work in Quebec and spent most of his life there, it is not surprising to know that a large part of his collection came from that region. But later in his life he received much material from other people so that his completed collection included species from many parts of Canada, the United States, Europe and some of the West Indian Islands.

Provancher described about 923 species and a few genera of Hymenoptera and most of this great number are valid. His largest and most comprehensive work on Hymenoptera is *Petite Faune Entomologique du Canada* and its *Additions*, but besides this he published several shorter papers on Hymenoptera in which new species are described. Considering the time, lack of facilities and literature, and his comparative isolation, Provancher had a very good idea of the limits of a species. The weakest point of his hymenopterological work was his conception of genera and generic limits. Even when we consider the genera he recognized, we often find that he placed the same or closely allied species in widely different genera. Hence, we find, especially in the parasites, that Provancher was often wrong in his generic placement of the species. His descriptions are accurate, and if we remember that the diagnostic characters of that period were limited mostly to colour, they are as satisfactory as those of his contemporaries.

Location of Collections.

Most of Provancher's types are in the Public Museum of Quebec, some are in the collection of Mr. W. Hague Harrington at Ottawa, a few are in the collection of the Canadian Department of Agriculture at Ottawa, while a few others were returned to Ashmead and Coquillett and are now in the United States National Museum. Some few types we were unable to locate. These may have been returned to the collectors.

In 1889 the College de Levis, Levis, Quebec, received a collection of insects from Provancher, and for some time it was thought to contain some of his types. Further investigation tends to prove that this collection was composed entirely of duplicates, and in certain cases these were not correctly determined.

A—Collection in the Public Museum at Quebec.

The collection in the Museum of Natural History, under the

Department of Public Instruction is now housed in the Parliamentary Building in Quebec, and is cared for by Abbé V. A. Huard and his assistant. In this Museum there are really two Provancher collections. The first was purchased in 1877 by the Museum and is known as the 1877 collection (in this paper referred to as the first collection). The other came to the Museum (through purchase) after Provancher's death, and is known as the Dernière Provancher collection, (in this paper referred to as the second collection). Both of these collections are in the cabinets obtained from Provancher, and most fortunately are still left as arranged by him. Each collection contains species not represented in the other, but in cases where the species was found represented in both collections and there was nothing in the description or manuscript notes to prevent, we have chosen as lectotype a specimen from the second collection, because this was the collection retained and used by Provancher until his death, and we are inclined to believe, even though he was not a "type-worshipper," that he would retain the actual type for future reference. Specimens in both collections bear small, yellow labels on which a number is printed. These numbers are species numbers and refer to a catalogue prepared by Provancher. Each insect order in both collections begins with the number one. In the Hymenoptera, therefore, considering both collections as a unit, we often have two, usually widely different species under the same number. There appears to be no instance in which the same species occurs under the same number in both collections. The two collections differ in the style of name label. The name label for the 1877 collection is on blue paper, while that for the second collection is on white paper which has a double red line (the outer being the heavier) around the margin.

The catalogues prepared by Provancher are in the Public Museum, and although they are little more than lists of numbers followed by names, with an occasional mention of locality, they are of some assistance in proving the way in which Provancher treated species reduced by him to synonymy.

A hasty examination of all the insects in both collections showed that they were in remarkably fine condition, considering that they are kept in wooden drawers unprotected by any repellent,

and which are closed by glass tops which set down inside, without any overlapping flange. A careful examination of the Hymenoptera proved that they were free from pests and in good condition. At the time of our visit the Hymenoptera of the 1877 collection were in museum case 35, and those of the second collection in the left hand column of case 46 and two drawers in the left hand column of case 49.

That Provancher had no concrete idea of the value of types is shown by the fact that in no case (with possibly a few exceptions in later years) were his types labeled as such. Furthermore, it is apparent that when he discovered one of his species to be a synonym he often removed the name label from the type and pinned the specimen among others of the species to which he thought it belonged. In other instances, upon deciding that one of his species was synonymous with another not already represented in his collection he removed the original name label and replaced it with what he considered to be the correct one. For example, there is no specimen in his collections labeled *Selandria flavicornis*. After describing this species Provancher concluded that it was the same as *Selandria halcyon*, and an examination of the catalogue shows under 60 the name *Selandria flavicornis* with the word "*flavicornis*" crossed out and above it written the word "*halcyon*." It, therefore, appears certain that the type of *Selandria flavicornis* stands in the collection under the name *Selandria halcyon*. In this case this is also proven by the fact that Provancher instead of supplying a new label just reversed the old label and wrote the name *Selandria halcyon* so that we find on the underside of the label for *S. halcyon* the original label for *Selandria flavicornis*. This one case is sufficient to show how Provancher worked. Many other similar cases could be mentioned. There are many cases, however, where there is no proof, either in the catalogue or in the labeling, that the types of some of Provancher's species which were later suppressed by him stand under the name of the species with which he considered them to be synonymous. In such cases we can only assume, from our knowledge of Provancher's methods, that this is what has taken place.

At no time while studying the collection did we remove any labels, and we were always very careful to put the specimens

back where they came from so that the collection still stands as it was arranged by Provancher. We did not even feel justified in labeling the specimens which we believed to be the type as lectotypes, and will rely in this paper entirely on the name label and the number label for means of correctly identifying the specimens which we believe should stand as type.

B—Harrington Collection.

The types in the Harrington collection are in good condition, and although they usually do not bear the name label in Provancher's writing we were assured by our friend Mr. W. H. Harrington that they were the identical specimens examined by Provancher as could easily be proven by a comparison of the number (they bear in addition to other labels a small, white square on which is written by Harrington a number) with the list as returned by Provancher.

C—Types in Collection of Canadian Department of Agriculture.

The types in the Department of Agriculture are in good condition, and have all been properly labeled as types.

D—Types in U. S. National Museum.

The types in the United States National Museum have all been accessioned and labeled with Museum type numbers.

Plan of Paper.

In submitting this list of the species described by Provancher and presenting notes on the location and condition of the types we have considered that it was much better to arrange them alphabetically as they appear in the final index published by Provancher as a conclusion to his two more important papers on Hymenoptera. We have chosen this method largely because there will be many more changes in generic position than those already published, and also because we do not know when we shall have an opportunity to completely review our notes and definitely assign the species of the genera as at present understood. Practically throughout this paper the word "type" is used in the sense of "lectotype." There are, however, certain cases when there was only one specimen, and there is no doubt that it is the specimen examined by Provancher and is, therefore, certainly the type.

At the time of our visit the type specimens of the species placed by Provancher in the Braconid subfamilies Aphidiinae and Opiinae were not available and the data on these were not secured. We hope, however, to secure and present it later.

Unless otherwise stated, it is to be understood that the specimens are in good condition. The letter (s) stands for the word "script." The numbers on the yellow labels are printed. Whenever possible, we chose as type the specimen which bore the name label written in Provancher's hand.

An Alphabetical List of Species With Designation of Lectotypes.

Acerota opaca. Type.—Yellow label 1381. 2nd Coll. Pub. Mus., Quebec. Two other specimens. Fair.

Acoenites canadensis. Type.—Male, yellow label 375. 2nd Coll. Pub. Mus., Quebec. Lacks antennae, right fore wing, hind tarsi, abdomen glued on.

Acoenites flavipes. Type.—Female, yellow label 1249. 2nd Coll. Pub. Mus., Quebec.

Acordulocera saginata. Type.—Yellow label 390. 2nd Coll. Pub. Mus., Quebec. Right fore wing gone.

Acothyreus mellipes. Type.—Yellow label 1320. 2nd Coll. Pub. Mus., Quebec. Fair.

Ægilips aciculatus. Type.—Not seen.

Agathis femorator. Type.—Female, yellow label 578. 2nd Coll. Pub. Mus., Quebec. Antennae wanting.

Agathis nigriceps. Type.—Female, yellow label 1680. 2nd Coll. Pub. Mus., Quebec.

Agathis perforator. Type.—Female, yellow label 577. 2nd Coll. Pub. Mus., Quebec.

Agathis quæditor. Type.—Female, yellow label 576. 2nd Coll. Pub. Mus., Québec. Lacks head.

Agathis scrutator. Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Male allotype. Both glued on slips.

Agathis tibiator. Type.—Female, yellow label 579. 2nd Coll. Pub. Mus., Quebec.

Agenia atrata. Allotype.—Male, blue label 125(s). Yellow label 1417. 2nd Coll. Pub. Mus., Quebec.

Agenia perfecta. Type.—Male, yellow label 783. 2nd Coll. Pub. Mus., Quebec. Antennæ wanting beyond 3rd joint. Four hind tibiæ gone.

Agenia rufigastra. Type.—Female, blue label 122(s), yellow label 1419. 2nd Coll. Pub. Mus., Quebec.

Allantus cogitans. Type.—Female, yellow label 44. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna. Two female paratypes. 1st Coll.

Allantus robustus. Type.—Female, Harrington Coll.

Allantus rubricus. Type.—Female, Harrington Coll. Lacks right antenna beyond 3rd joint.

Alomya pulchra. Type.—Not in Pub. Mus., Quebec, unless under name *Phygadeuon pubescens* Prov.

Alysia astigma. Type.—Female, yellow label 1051. 2nd Coll. Pub. Mus., Quebec. Left flagellum gone and only base of right remaining.

Same specimen used as type of *Aspilata astigma*.

Alysia completa. Type.—Female, yellow label 1166. 2nd Coll. Pub. Mus., Quebec.

Alysia fossulata. Type.—Cat. No. 1970, U. S. N. M.

Alysia lucens.—Type.—Female, yellow label 909. 2nd Coll. Pub. Mus., Quebec.

Alysia nigriceps. Type.—Female, yellow label 539. 2nd Coll. Pub. Mus., Quebec. Right flagellum and extreme apex of left gone.

Alysia rubriceps. Type.—Male, yellow label 1052. 2nd Coll. Pub. Mus., Quebec. Same specimen used as type of *Phænocharpa rubriceps* Prov.

Alyson conicus. Type.—Male, blue label 622(s), yellow label 1449. 2nd Coll. Pub. Mus., Quebec. Lacks most of left flagellum.

Alyson guignardi. Type.—Female, yellow label 1433. 2nd Coll. Pub. Mus., Quebec.

Alyson triangulifer. Type.—Male, yellow label 1450. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ.

Amblyopone binodosa. Type.—Yellow label 948. 2nd Coll. Pub. Mus., Quebec. Fair. (*Arotropus binodosa*).

Amblyteles bifasciatus. Type.—Yellow label 227. 1st Coll. Pub. Mus., Quebec.

Amblyteles borealis. Type.—Female, yellow label 1002. 2nd Coll. Pub. Mus., Quebec.

Amblyteles indistinctus. Type.—Female, yellow label 185. 2nd Coll. Pub. Mus., Quebec.

Amblyteles macrocephalus. Type.—Male, yellow label 1063. 2nd Coll. Pub. Mus., Quebec. Both antennæ broken, one at 1st flagellar joint, other at middle, 1 anterior, 1 median and 1 hind leg missing.

Amblyteles marginatus. Type.—Female, yellow label 700. 2nd Coll. Pub. Mus., Quebec.

Amblyteles perluctuosus. Type.—Female, yellow label 172. 2nd Coll. Pub. Mus., Quebec.

Amblyteles quebecensis. Type.—Yellow label 181. 2nd Coll. Pub. Mus., Quebec.

Amblyteles stadaconensis. Type.—Male, yellow label 175. 2nd Coll. Pub. Mus., Quebec.

Amblyteles superbus. Type.—Female, Harrington Coll.

Amblyteles tetricus. Type.—Female, yellow label 171. 2nd Coll. Pub. Mus., Quebec.

Anacharis marginata. Type.—Yellow label 1318. 2nd Coll. Pub. Mus., Quebec. Abdomen off but on triangle below.

Anacharis pediculata. Type.—Blue label 762(s), yellow label 1317. 2nd Coll. Pub. Mus., Quebec.

Anacharis subcompressa. Type.—White label "Quebec"; yellow label 616. 2nd Coll. Pub. Mus., Quebec. Abdomen gone.

Anacrabro constrictus. Type.—Male, tag-mounted, yellow label 1690. 2nd Coll. Pub. Mus., Quebec.

Anacrabro lævis. Type.—Female, yellow label 1691. 2nd Coll. Pub. Mus., Quebec.

Andricus gibbosus. Type.—Yellow label 609. 2nd Coll. Pub. Mus., Quebec. Head and abdomen gone. *Cynips (Andricus) gibbosa*—under *Cynips* in list.

Aneurychus foveatus. Type.—Blue label 83; yellow label 1330. 2nd Coll. Pub. Mus., Quebec. Fair.

Aneurychus mellipes. Type.—Yellow label 1331. 2nd Coll. Pub. Mus., Quebec.

Anomalon chlamidatum. Type.—Female, yellow label 1217. 2nd Coll. Pub. Mus., Quebec. Left antenna missing beyond fourth joint and right hind leg at coxa.

Anomalon exile. Type.—Female, yellow label 329. 1st Coll. Pub. Mus., Quebec. Left antenna at 15th joint, left median and both hind legs at coxæ gone; left fore wing gone and right broken at middle.

Anomalon filiforme. Type.—Female, yellow label 1218. 2nd Coll. Pub. Mus., Quebec.

Anomalon nigripennis. Type.—Probably pinned under *Exochilum mundum* Say. 1st Coll. Pub. Mus., Quebec.

Anomalon rufulum. Type and Allotype.—Harrington Coll. Both antennæ, tarsi, except one anterior, broken and lost. Female paratype yellow label 1213, blue label 481. 2nd Coll. Pub. Mus., Quebec.

Anomalon unicolor. Type.—Female, yellow label 1216. 2nd Coll. Pub. Mus., Quebec.

Apanteles acaudus. Type.—Female, yellow label 1285. 2nd Coll. Pub. Mus., Quebec.

Apanteles carpatus. Type.—Apparently destroyed. Pin bearing yellow label 592 in 2nd Coll. Pub. Mus., Quebec.

Apanteles clavatus. Type.—Female, yellow label 642. 2nd Coll. Pub. Mus., Quebec. Badly broken and plastered up with glue. Antennæ, one median and both hind legs gone. Specimen in U. S. N. M. labeled type not type.

Apanteles cinctus. Type.—Female, yellow label 716. 2nd Coll. Pub. Mus., Quebec. Antennæ broken near middle. Faun. 529. Add. S. 388.

Apanteles crassicornis. Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Antennæ and hind tarsi broken.

Apanteles femur-nigrum. Type.—Male, yellow label 1578. 2nd Coll. Pub. Mus., Quebec. One antenna broken, one front and one hind leg missing.

Apanteles longicornis. Type.—Female, yellow label 1258. 2nd Coll. Pub. Mus., Quebec.

Aphæreta auripes. Type.—Specimen in Public Mus., Quebec, bearing name label in Provancher's hand. Other data not taken. Specimen in U. S. N. M. labeled type, not type.

Aphidaria basilaris. Type.—See Introduction.

Aphidius canadensis. Type.—See Introduction.

Aphidius nigrovarius. Type.—See Introduction.

Aphidius obscurus. Type.—See Introduction.

Aplomerus tibialis. Type.—Female, Ent. Branch, Dept. Agr., Ottawa. Left antenna wanting beyond 5th joint.

Arenetra quebecensis. Type.—Not in Pub. Mus., Quebec, unless under *Lampronota tegularis*.

Arotes superbus. Type.—Not in Pub. Mus., Quebec, unless under name *A. vicinus* Cress.

Arotropus binodosus.—See *Amblyopone*.

Ascogaster rufipes. Type.—Female, yellow label 1254. 2nd Coll. Pub. Mus., Quebec. Rather dirty. (This number in Prov. catalogue refers to *Chelonus rugulosus* Prov. There is no such species.)

Aspilota astigma.—See *Alysia astigma*.

Atractodes autumnalis. Type.—Female, yellow label 706. 2nd Coll. Pub. Mus., Quebec.

Atractodes nigricoxus. Type.—Male, yellow label 984. 2nd Coll. Pub. Mus., Quebec. Left hind tarsus broken at 2nd joint.

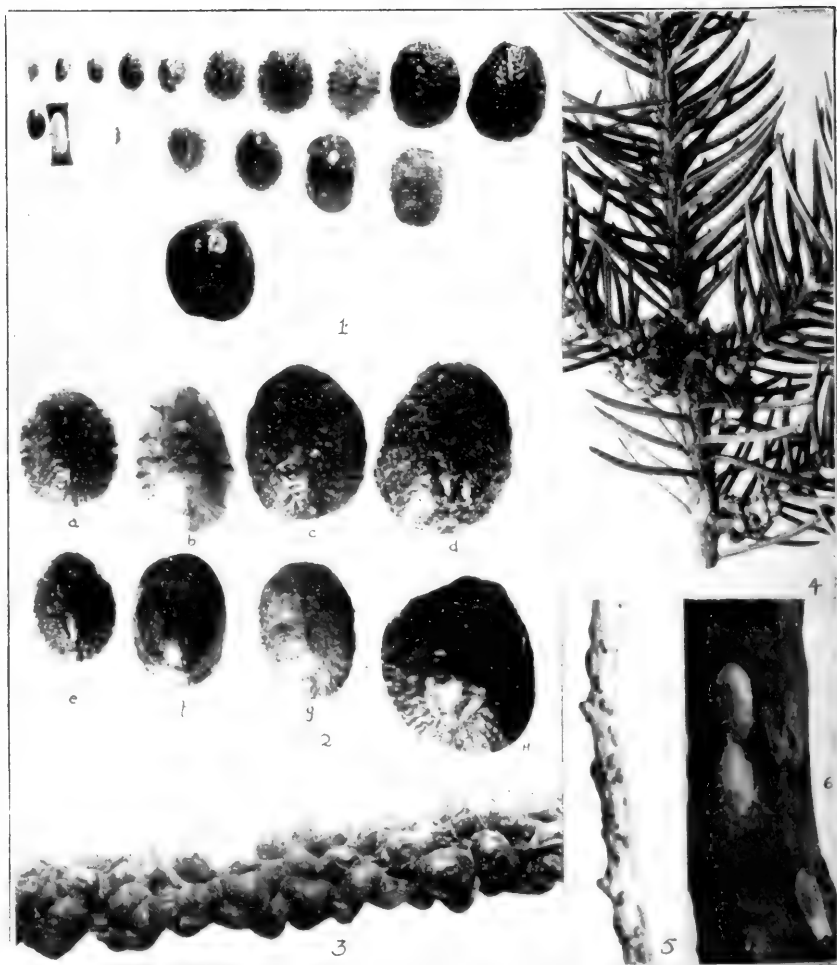
Atractodes nitens. Type.—Male, yellow label 695. 2nd Coll. Pub. Mus., Quebec. Female not located in either collection.

Atractodes scapiphorus. Type.—Yellow label 307. 2nd Coll. Pub. Mus., Quebec. Badly broken; only thorax, coxæ in part and wings, except right fore wing, remaining.

Aulacus bilobatus. Type.—Male, yellow label 82. 2nd Coll. Pub. Mus., Quebec. Left antenna gone.

(To be continued.)





LECANIUM CORNI (Fig. 1, 2, 3, 5 and 6) AND
PHYSOKERMES PICEÆ (Fig. 4).

OBSERVATIONS ON *LECANIUM CORNI* BOUCHE, and
PHYSOKERMES PICEÆ Schr.*

BY F. A. FENTON, COLUMBUS, O.

The following studies on the life history and habits of two of our common soft scale insects were made at Madison, Wisconsin, under the direction of Prof. J. G. Sanders. The writer is greatly indebted to Professor Sanders for invaluable assistance and to Mr. A. A. Girault for the determination of parasites.

THE EUROPEAN FRUIT *LECANIUM* (*Lecanium corni* Bouche).

Lecanium corni, probably native of Europe and one of our commonest and most widely distributed soft scales, has been the subject of much discussion in various scientific and popular journals. Sanders¹ has demonstrated that it is capable of much variation in form, size, and coloration even on the same host, and since it develops on numerous plants it is especially subject to a variety of normal environmental conditions. For instance, on hickory the ovipositing females are almost invariably white with black markings (Plate XV, fig. 2b), instead of the normal brown coloured forms (Plate XV, fig. 2a). Parasitism and disease produce abnormally developed forms, and these as well as immature individuals have been described as separate and distinct species.

History.—This insect was first reported in this country in 1851 when Fitch described it as *Lecanium tilia*². In 1859 it was found in Canada and in the United States as far west as Minnesota³, and in 1891 Crawford found it in large numbers in California⁴. Until 1908 there was much confusion regarding the identity of this species as its numerous synonyms indicate. It was found, however, that while external appearances might be extremely variable, certain microscopical characters remained constant, and Marchal⁵ and Sanders⁶ reduced to synonymy some forty so-called species, the form described by Bouche in 1844 as *Lecanium corni* having priority.

*Contributions from Entomological Department, University of Wisconsin.

1. Sanders, Jour. Ec. Ent., Vol. II, No. 6, pp. 443-445, 1909.

2. Fitch, 4th. Rep. Reg. Univ., N.Y., p. 69, 1859.

3. Fitch, 3rd Rep. Ins., N.Y., p. 50, 1859.

4. Crawford, Rep. Calif. Bd. Hort., p. 12, 1891.

5. Marchal, Ann. Soc. Ent. Fr., LXVII, p. 264, 1908.

6. Sanders, *loc. cit.*

September, 1917

Distribution and Economic Importance.—*Lecanium corni* is found throughout most of the United States and is known to occur as far north as Nova Scotia and Ontario, and south into Mexico. In spite of the wide range of its host plants and its general distribution this insect seldom becomes of economic importance, although serious outbreaks of it have been recorded. In 1891 Crawford⁷ reported its occurrence in California where it had become and still remains a serious pest of apricot and prune trees, and in 1894 Slingerland⁸ found a similar and doubtless the same species occurring in destructive abundance in the larger plum growing districts of New York.

Food Plants.—The European fruit lecanium, as already indicated, has been found on a wide variety of deciduous shrubs and trees, and it has received various popular names in different localities, according to its favorite host plant, being known in New York as the "plum scale," and in California as the "apricot scale". The following list gives an idea of the extent of its food plants.

<i>Aceraceæ</i>	<i>Acer macrophyllum</i>	
	" <i>negundo</i>	Box elder.
	" <i>saccharinum</i>	Soft maple.
	" <i>saccharum</i>	Sugar maple.
<i>Betulaceæ</i>	<i>Betula alba</i>	White birch.
	<i>Ostrya virginiana</i>	Hop hornbeam.
	<i>Corylus americana</i>	Hazelnut.
	" <i>rostrata</i>	Beaked hazelnut.
<i>Caprifoliaceæ</i>	<i>Viburnum pubescens</i>	Pursh.
<i>Celastraceæ</i>	<i>Evonymus sanguinea</i>	Evonymus.
<i>Compositæ</i>	<i>Grindelia</i> spp.....	
<i>Cornaceæ</i>	<i>Cornus alternifolia</i>	
	" <i>sanguinea</i>	
<i>Ericaceæ</i>	<i>Vaccinium corymbosum</i>	High bush blueberry.
<i>Fagaceæ</i>	<i>Castanea dentata</i>	Chestnut.
	<i>Quercus palustris</i>	Pin oak.
	"	Laurel oak.

7. Crawford, *loc. cit.*

8. Slingerland, Cornell Exp. Sta. Bull. 83, 1894.

<i>Hamamelidaceæ</i>	<i>Liquidambar styraciflua</i>	Sweet gum.
<i>Juglandaceæ</i>	<i>Hicoria alba</i>	Shag-bark hickory.
	<i>Juglans cinerea</i>	Butternut.
	<i>nigra</i>	Black walnut.
<i>Lauraceæ</i>	<i>Sassafras sassafras</i>	Sassafras.
<i>Leguminosæ</i>	<i>Cercis canadensis</i>	Red bud.
	<i>Gymnocladus dioica</i>	Kentucky coffee tree.
	<i>Gleditsia triacanthos</i>	Honey locust.
	<i>Robinia pseudacacia</i>	False acacia.
<i>Magnoliaceæ</i>	<i>Magnolia</i> spp.....	Magnolia.
<i>Oleaceæ</i>	<i>Fraxinus americana</i>	White ash.
	<i>Amelanchier canadensis</i>	Shad bush.
<i>Rosaceæ</i>	<i>Prunus armeneaca</i>	Apricot.
	" <i>cerasus</i>	Cherry.
	" <i>domestica</i>	Plum.
	" <i>galatensis</i>	Prune.
	<i>Pyrus communis</i>	Pear.
	" <i>malus</i>	Apple.
	<i>Rosa</i> spp.....	Rose.
	<i>Rubus</i> spp.....	Cultivated blackberry.
	<i>Rubus</i> spp.....	" raspberry.
<i>Salicaceæ</i>	<i>Populus</i> spp.....	Poplar.
	<i>Salix</i> spp.....	Willow.
<i>Saxifragaceæ</i>	<i>Ribes</i> spp.....	Currant.
	".....	Gooseberry.
<i>Solanaceæ</i>	<i>Solanum dulcamara</i>	Climbing bittersweet.
<i>Tiliaceæ</i>	<i>Tilia americana</i>	Linden.
<i>Urticaceæ</i>	<i>Celtis occidentalis</i>	Hackberry.
	<i>Maclura pomifera</i>	Osage orange.
	<i>Morus rubra</i>	Red mulberry.
	<i>Ulmus americana</i>	American elm.
<i>Vitaceæ</i>	<i>Vitis</i> spp.....	Grape.

Life History.—*Lecanium corni* passes the winter in the second instar, the larvæ being found attached to the bark, generally preferring the underside of the branch and appearing as small, brown, flattened, oval bodies closely appressed to the surface. The appendages are withdrawn beneath the scale over which a thin, transparent, waxy covering is secreted.

Growth in spring is coincident with the beginning of sap flow, the insects seldom migrating, and within a week moulting for the second time. (Plate XV, fig. 5). Following this the male larva undergoes a series of transformations quite distinct from those of the female.

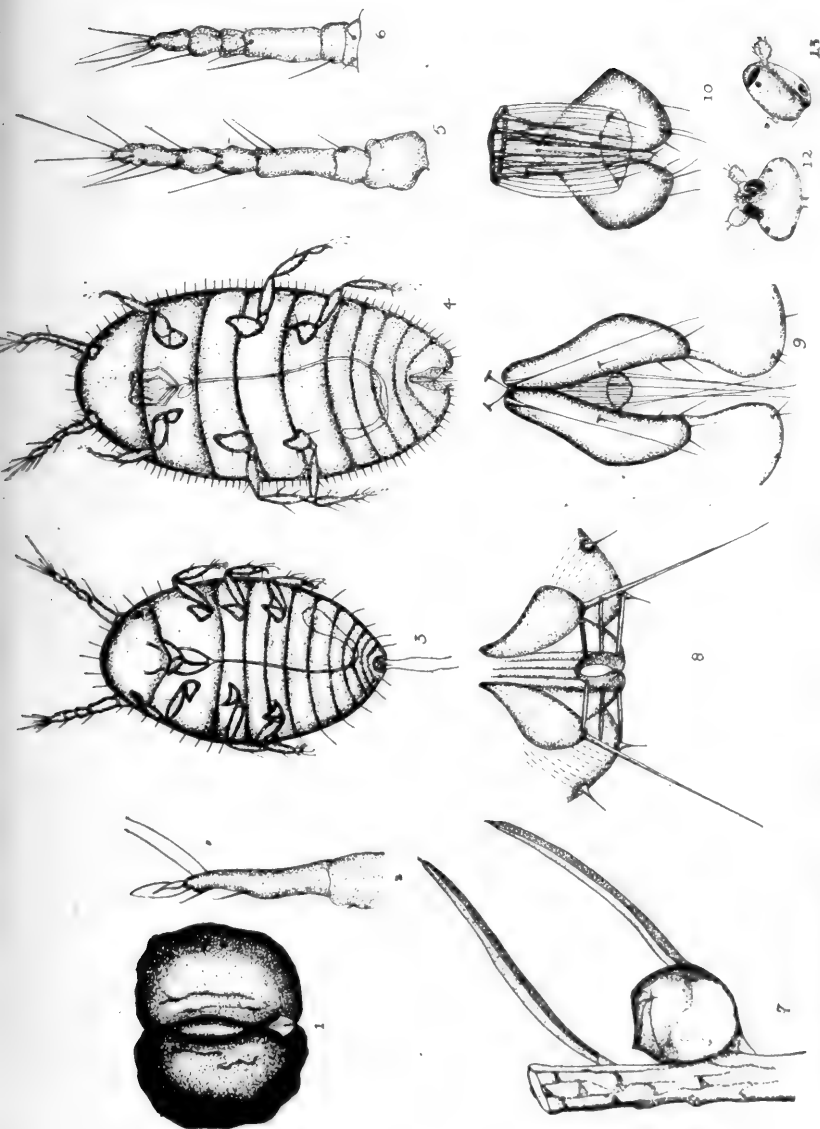
Male.—With the second moult the male enters a quiescent period known as the propupal stage during which no food is taken, and which is characterized externally by the beginning of a wax secretion over the scale or puparium which becomes separate from the insect. All larval appendages are cast off and are replaced by the developing legs and wings of the adult. This period is transitional, seldom extending more than two days.

The true pupa, which is flesh-coloured, may be easily seen beneath the opaque puparium, being distinguished only by the further development of its appendages and by the distinct segmentation of the body. Externally the secretion of wax has continued and the male scales differ from those of the females in their smaller size, more elongate shape, and wire-glassy appearance.

. In from three to seven days the final moult of the male takes place within the puparium and is indicated by the wings and developing caudal filaments which often protrude beyond the scale. (Plate XV, fig. 6.) In a few hours after the last transformation the mature insect backs out from the puparium and is ready for flight. It is very delicate and lives but a few hours.

The emergence of the male generally covers a period of four weeks, the date of earliest emergence depending largely on the host species. The first males were bred out from scales collected on linden. They issued from the middle of April till the middle of May. On hickory and bittersweet males did not begin to emerge until the first of May and continued to mature until the middle of June. On elm and white ash they did not begin to issue until late in May, and the last individuals appeared late in June.

Female.—Following the second moult the female increases rapidly in size. Owing to the continued growth the protective wax covering is split and appears as irregular plates on the dorsum. These finally disappear and when mature the female is smooth, broadly oval, and slightly convex, with darker markings plainly visible on the lighter specimens. The comparative size with that of the male is indicated on Plate XV, fig. 1. Several stiff iridescent strands of wax project from the margin of the scale which may function as a secondary sexual character. Shortly after impregnation a chestnut or brown colour prevails, the surface becomes



PHYSOKERMES PICEAE (Figs. 1-9), AND *LECANIUM CORNI* (Figs. 10-13).

pitted and as growth continues, the body is arched upwards becoming quite convex.

In the latitude of Southern Wisconsin development continues with great rapidity during May and early June, the ovisac becoming distended with eggs. Within three weeks the females stop feeding and a week later oviposition commences. Scattered individuals begin egg laying by May 25 but the majority not until June 11. The eggs are deposited beneath the scale in a cavity or brood chamber formed by the shrinking ovisac, and this process continues until the venter becomes fused with the dorsum. At the end of egg laying the parent insect remains as a mere shell, which acts as a barrier against various egg predators and parasites.

The number of eggs laid by a single female varies considerably and over two thousand have been counted⁹. Small individuals may contain only a few hundred, but the average number is considerably over a thousand.

The oviposition period terminates by the middle of June, and eggs under observation on different hosts began to hatch during the first days of July, although in one exceptional instance one female was found to contain hatching young June 12. July 5 *Lecanium corni* was found hatching on ash, linden and apple, and a few days later on bittersweet. Practically all the young had issued by July 1 in spite of the fact that the dates of oviposition extended nearly a month. The young remain under the old scale until it becomes loosened, which is usually about five days from the time the first eggs hatch. This short period of rest is not essential to the life of the insect, and when a scale is removed from hatching young they immediately migrate to the leaves. They generally settle on the underside and when numerous attach themselves along the principal veins, where they remain until autumn.

Just before the leaves fall the immature scales migrate back to the bark, having moulted once. The percentage of those successful in re-establishing themselves in this way is not known, and it is possible that many are distributed to different hosts by the scattering of the leaves.

Description.—The eggs are oval, and protected by a powdery wax deposit, measuring .246 mm. by .112 mm. They are pure

9. Lowe, V. H., Rep. N. Y. State Exp. No. 14, 1895.

white when laid, but change to cream yellow previous to hatching.

The young larvæ measure .37 mm. in length and .135 mm. in width and are pale yellow, with eight distinct abdominal segments, but with no definite body divisions. The antennæ are short, six segmented, with numerous long setæ. Two anal plate spines are conspicuous, being about one-third the length of the body. After settling the insects assume a transparent green colour and are practically invisible on the surface of the leaf.

The second stage larva is distinguished microscopically from the first by the absence of the major apical setæ which disappear at the first moult. Upon migrating to the bark the green colour is replaced by brown. In this stage two sizes become differentiated, the larger measuring about one mm. in length, and the smaller .7 mm.

The puparium is a rather elongate oval structure 1.5 mm. in length and .75 mm. in width, the white, glassy colour sharply contrasting with the bark. It is slightly convex and is adorned by two longitudinal and two transverse white lines. (Plate XV, fig. 6.) These scales are fragile and the empty ones are easily dislodged, seldom being found later in the season.

The adult male is a small, brown, two-winged insect $1\frac{1}{4}$ mm. in length, with a wing expanse of 4 mm. and having two long, white caudal filaments. The antennæ are relatively large, eight segmented, and densely clothed with hairs. The head is provided with six ocelli, one pair being located ventrally and two dorsally. (Plate XVI, figs. 12 and 13.) The wings are clouded with a tinge of brown and no halteres are present. There are six segments in the abdomen which terminates in a large style at either side of which are secreted the two long wax filaments.

At maturity the female is a smooth, brown hemisphere, and is incapable of locomotion, the appendages having been greatly outgrown by the swollen body which is fastened to the bark by a deposit of wax. (Plate XV, fig. 3.) Microscopically the anal plates (Plate XVI, fig. 10) are conspicuous and obtusely triangular, having eight anal ring setæ, four fringe, two sub-apical, and eight apical setæ. Fully mature females still possess the appendages though in an atrophied form, and may measure from 3 by 2 mm.

to 7 by 5 mm. During oviposition and accompanying the hardening of the derm, the latter becomes perforated with minute openings known as derm pores.

Experiments in host plant transfers.—A number of experiments were undertaken in view of definitely determining whether *Lecanium corni* could be transferred from one host plant to another, and the following table represents the results obtained.

TABLE I.—TRANSFER EXPERIMENTS WITH *LECANIUM CORNI*.

Original host	Number females used	Host transferred to	Date eggs hatched	Date larvæ attached	Number larvæ attached
White ash.....	3	pear	July 7	July 16	several
"	1	apple	"	"	"
"	1	elm	"	"	"
"	1	plum	"	"	"
"	2	sour cherry	"	"	"
Climbing bitter-sweet.....	several	apple	"	July 17	"
Elm.....	"	"	"	"	"
Linden.....	"	"	"	"	"
Kentucky coffee tree.....	"	"	"	"	"
Pear.....	"	"	"	"	"
Plum.....	"	"	"	"	"
Black locust.....	"	"	"	"	"
Plum.....	"	pear	"	"	"
Linden.....	"	"	"	"	"
Elm.....	"	"	"	"	"
Linden.....	"	currant	"	"	"
Ash.....	"	plum	unsuccessful		
Bittersweet.....	"	"	"		
Linden.....	"	ash	"		
Maple.....	"	shag bark hickory	"		

It will be observed that in several instances unsuccessful attempts were made to transfer *Lecanium corni*, but this was due to either parasitism or dislodgement of the females.

Parasites.—The following species of Chalcidoidea were bred from *corni*, which on some trees was badly parasitized and almost exterminated—*Coccophagus lecanii* Le Baron var., *C. cinguliventris* Gir., *C. perflavus* Gir. mss., *Blastothrix longipennis* How., and several male encyrtids. Besides these parasites, *Comys bicolor* How., *Coccophagus lecanii* Fitch, *Euderus lividus* Ashm., and *Aphicus albiceps* Ashm., have been bred from this scale in Michigan.¹⁰ By far the most numerous and effective one in this region proved to be *C. lecanii*, although in California *Comys fusca* How., a species not found at Madison, and probably not occurring in Wisconsin, seems to be the chief check.

Predators.—The maggots of a small fly, *Leucopsis nigricornis* Egger, were observed feeding on the eggs. Two common coccinellid beetles *Hyperaspis binotata* Say, and *Chilocorus bivulnerus* Mulsant, are important enemies, the larvæ feeding on the eggs and young.

Disease.—The adult females are susceptible to several fungous diseases, which with favourable conditions, spread rapidly and destroy many of the insects. *Cordyceps clavulatum* Ellis is the most important of these and was first mentioned as being parasitic on *Lecanium corni* by Pettit in 1895.¹¹

THE SPRUCE SCALE, (*Physokermes piceæ* Schr.).

Physokermes piceæ Schr. is found abundantly on the Norway spruce (*Picea abies*) about the University of Wisconsin campus, and has become a serious pest of this tree. It is especially numerous on the lower branches, many of which are being killed by it, and which are rendered unsightly by a black fungus thriving on the honey-dew secreted by these insects. The heavy honey-dew secretion is also very attractive to flies, and especially honey bees.

History and Distribution.—In 1903 *Physokermes piceæ* was believed to be confined to Europe,¹² and it was not reported in this country until 1906 when it was discovered near Hartford, Connecticut. Since then it has been found in various northern localities as far west as Wisconsin. The following list of American records of its distribution was kindly furnished by Mr. E. R. Sasser, of Washington, D.C., Massachusetts.

10. Lowe, V. H., *loc. cit.*, p. 589.

11. Pettit, R. H., Cornell Exp. Sta. Bull., 97, p. 341, 1895.

12. Fernald, M. E., Mass. Exp. Sta. Bull., No. 88, p. 209, 1903.

Massachusetts				
Amherst.....	<i>Picea abies</i>	June 9, 1908.....	B. N. Gates.	
".....	" <i>menziesii</i>	" 8, 1910.....	"	
Malden.....	".....	May 25, 1908.....	W. T. Harris.	
Hanover.....	<i>Pinus strobus</i>	Oct. 19, 1912.....	J. W. Hinckley.	
Connecticut				
Hartford.....	<i>Picea abies</i>	June 23, 1906.....	W. H. Patton.	
New Hampshire				
Pike.....	<i>Picea rubens</i>	" 3, 1909.....	E. J. Kraus.	
New York				
Yonkers.....	<i>Picea</i> spp.....	" 15, 1912.....	W. L. Kingman.	
Pennsylvania				
West Chester.....	<i>Picea menziesii</i>	Nov. 28, 1914.....	F. Windle.	
Ontario				
Guelph.....	<i>Picea</i> spp.....	July 14, 1910.....	T. D. Jarvis.	

It is thus an introduced species from Europe, and is dependent on spruce and pine as host plants. It in fact seems to prefer the Norway Spruce *Picea abies*, being found on no other tree in Madison, Wisconsin, although in some instances the infestation was surrounded by different species of spruce.

Life History.—In winter the second stage larvæ are found clustered thickly on the undersides of the spruce needles. They remain dormant until the latter part of March, when they become active and may be observed migrating from one branch to another. This period of spring activity is of short duration and by April the majority have settled on the leaves.

By the middle of April those larvæ which are to develop into females migrate to the twigs. The male larvæ remain attached to the undersides of the needles, where they moult twice during a period of development in which the insect passes successively from a propupal to a true pupal stage beneath the first exuvia which becomes coated with wax.¹³ The adult males issue within two weeks after the twigward migration of the females and fertilization takes place by the first of May, shortly following the second moult of the females.

Female.—The majority of the female larvæ settle in the woody bracts at the bases of the smaller twigs. In this stage growth is at first slow, and tendril-like wax filaments are secreted around the margin of the scale. In two weeks the insects moult for the second and last time, all appendages being lost, a mere globular sac resulting. This change takes place early in May,

13. Henschel, Die Schadl. Forst. and Obst. Ins., p. 511, 1895.

practically all larvæ being in the last instar by May 3. In this month growth is rapid, the females maturing by the first of June. Specimens dissected May 29 were found to contain fully developed eggs.

Oviposition began June 9 at which time large quantities of the honey-dew persisted. As the eggs are deposited the internal structures of the female shrink until the body organs become obliterated and persist as a thin septum dividing the egg chamber into halves. During the development of the insect, the anal cleft lengthens, due to the great enlargement of the body wall, until it comes to lie dorsally. Thus at the end of oviposition the female remains as a hollow sphere, divided internally into two cells closely packed with eggs, the number of which varies from only 12 in small individuals to as many as 227, the average being about 200.

The period of incubation extends for a month and larvæ were observed hatching July 27. At this time they are entirely surrounded by the body wall of the dead female, the anal cleft being entirely closed; but within a week, the mechanical drying and shrinking of the derm causes the cleft to split apart, producing an opening through which the young can pass. The larvæ immediately migrate to the spruce needles upon which they settle, growing slowly and moulting once before autumn.

Description.—The eggs are .4 mm. by .24 mm. and are smooth, ovate and pink in colour. The hatching young (Plate XVI, fig. 3.) are small, red, lice-like insects .5 mm. in length. Microscopically the antennæ are six-segmented, (Plate XVI, fig. 6), and the anal plate is well defined, having the usual major apical setæ, (Plate XVI, fig. 8). No spiracular spines are present in this species although found in others of this genus.

There is little difference between the two larval stages except that microscopically the anal plates are further developed, (Plate XVI, fig. 9). Just preceding the second moult the larva is about 1 mm. in length, (Plate XVI, fig. 4).

The adult female is a brown sphere, averaging from 1.5 mm. to 3 mm. in diameter, (Plate XVI, fig. 3). It presents a very curious appearance when alive, capped with a large transparent viscid globule of honey dew, and clothed basally with a thin sheath of white wax, (Plate XV, fig. 4). During life the body wall is plastic

and adapts itself to the irregularities in the bark, but upon maturing it becomes heavily chitinized and extremely rigid.

The old dead female shells are generally found at the juncture of the twigs in groups of from two to as many as eight. They are of a chestnut brown colour, closely resembling buds, and are dislodged with difficulty, often remaining attached to the bark for several years. Microscopically few structures are visible, the appendages and anal plate having been lost with the second moult.

Parasites.—A parasite seems to have been introduced with the species from Europe and is effective in checking the spread of the scale. This was determined to be a new species and was recently described by Girault as *Holcencyrtus physokermis*. *Cheiloneurus albicornis* How., and several encyrtids were bred from this insect.

A NEW CANADIAN NOCTUID.

BY WM. BARNES, M.D. AND J. McDUNNOUGH, PH.D.

DECATUR, ILL.

***Xylomoia chagnoni*, sp. nov.**

♂.—Antennæ finely ciliate; head and thorax light ruddy brown, the collar crossed by a black line; abdomen untufted, light ochreous; primaries rather pale ruddy-brown with the maculation not well defined, the most conspicuous feature being a black dash in the sub-median fold connecting the t. a. and t. p. lines; sub-basal line very obscure, angled below costa; t. a. line better defined, faintly gminate, the inner line more or less obsolete, the outer black, with a prominent outward angle below vein 1, preceded by a slight dark shade along inner margin; orbicular and reniform very faint, rather small, the former oblique, the latter defined on its inner edge by a black lunate mark; claviform scarcely visible resting on the black streak in the fold; t. p. line faint; strongly bent out around cell, then rigidly inwardly oblique to vein 1 where it bends outward slightly to inner margin, it is followed by a few dark points on the veins; s. t. line pale, obscure, irregular, defined outwardly by two darker terminal semi-triangular patches, the

one at inner angle, the other between veins 4-6; a rather heavy terminal broken black line; veins terminally slightly paler than ground colour; fringes smoky, cut by a median dark line and dotted with ochreous opposite veins. Secondaries pale shiny ochreous, shaded with smoky terminally, with large, dark discal dot and distinct wavy post-median line; a broken, dark, terminal line and a median line through pale fringes. Beneath smoky with slight ruddy tinge and paler secondaries; dark discal dots and terminal lines on both wings but post-median line of secondaries less distinct than on upper side. Expanse 30 mm.

Habitat.—Rouville Co., Que., (July 4); Mt. St. Hilaire, Que., (July 4, 6). 3 ♂'s. Type, Coll. Barnes. Paratype, Coll. Chagnon.

We have much pleasure in naming this species after Mr. G. Chagnon, of Montreal, from whom we received the type specimens. The species bears considerable superficial resemblance to *Xylomoia didonea* Sm. from Colorado, but lacks among other things the distinct white-marked t. p. line as well as showing a well-defined post-median line on secondaries; the front is rather improminent, being slightly less bulging than in *didonea* but the species resembles so markedly the figure of the generic type, *Xylomoia graminea* Staud., figured in Rom. Mem. VI, Pl. 12, fig. 8, that we incline to place it in this genus. We have single worn specimens of this new species from Cartwright, Man., and Durango, Colo., which would indicate an extended distribution.

AN ANNOTATED LIST OF THE SCOLYTID BEETLES OF OREGON.

BY W. J. CHAMBERLIN, OREGON EXPERIMENT STATION,
CORVALLIS, ORE.

Conophthorus ponderosæ Hopk.

There are a number of specimens in the College Collection taken at Corvallis, Oregon, Dec. 17, 1909.

Conophthorus, sp.

Three adults bred from cones of *Pinus contorta* collected at Corvallis, Oregon. Oct. 29, 1915.

Cryphalus amabilis, n. sp.

Length.—Female, 1.6 mm.; male 1.2 mm. Body oblong.
September, 1917

elliptical, dark brown, almost black; pronotum slightly broader than long, broadest just before the base, constricted sharply at base so as to be slightly narrower than the base of elytra; pronotum rounded, hood-shaped, anterior margin with two distinct teeth near the apex, an obscure tooth lateral to each; pronotum with prominent callosities arranged in six or seven, more or less concentric circles; spaces between callosities with minute elevations, elytra finely and densely punctured; striae plainly seen but appear as mere lines of enlarged punctures. Entire body covered with fine yellowish hair, short on elytra, longer and coarser on pronotum; ventral surface and legs clothed with medium long yellowish hairs.

Described from seven specimens, four males and three females taken at Elk Lake, Oregon, August, 1914, Host *Amabilis Fir* (*Abies amabilis*).

A small stand of *Amabilis Fir* (*Abies amabilis*) saplings was noted near Elk Lake at an elevation of 3,300 feet. The trees looked sickly and the foliage on many branches was turning red. Upon examination a tiny entrance hole was found just below many of the branches, and a small, oval chamber was eaten out. These chambers averaged from $\frac{1}{8}$ to $\frac{1}{4}$ inch across the longest diameter and from 20 to 35 eggs were deposited therein, mingled with fine bark borings. The eggs were slightly over $\frac{1}{2}$ mm. long and $\frac{1}{4}$ mm. wide, oval, transparent and white. The larvæ when first emerged are about the size of the egg and grow very slowly for some days. They develop to slightly over $2\frac{1}{4}$ mm. long, but never become very active. The pupæ are from $1\frac{3}{4}$ to 2 mm. in length and $\frac{1}{2}$ to $\frac{3}{4}$ mm. broad. The pupal cells are in the cambium.

Eggs are deposited the last week in August and hatch in 5 days; the slightly yellowish larvæ work out in all directions from the egg chamber, girdling the small limbs and covering a space of 5 or 6 square inches. Though not definitely established, it is very probable that each pair of beetles make more than one egg chamber. Both male and female work at excavating the egg chamber.

Cryphalus subconcentralis Hopk.

Astoria, Oregon. May 24, 1899. Hubbard & Schwarz.

Cryphalus grandis, n. sp.

Length 1.8 mm.; width 0.8 mm.

Body size and shape of *C. amabilis*; colour black. Pronotum with four teeth on the anterior margin, two central teeth large, rounded, lateral ones narrower, smaller. Dorsal surface rather densely clothed with pale hairs. First two lines of callosities on the pronotum regular, posterior portion more or less confused. The entire dorsal surface presents a granulate appearance, a condition not noted in any other species. Striæ faintly evident, especially laterally; elytra sparsely clothed with long, bristle-like hairs. Faint transverse rugulae on the elytra. Elytra clothed with fine hairs (not scale-like) and finely obscurely punctate. Legs amber coloured, antennal club dark. Ventral surface clothed with recumbent, yellowish hairs. Lateral margin of the elytra shows a very broad emargination near the middle, and a distinct ridge extends from the humeri to the posterior lateral margin of the elytra. (Not constant.)

A large number of specimens from *Abies grandis* near Corvallis, Oregon, collected by the author. Hairs on pronotum dense, medium long, recumbent toward anterior margin; bristle-like hairs of dorsal surface very long.

Crypturgus, undes. sp.

A number of these minute insects were taken from a dead fir (*Abies lasiocarpa*) near Sumpter, Oregon, July 20, 1914. In company with other bark beetles, they were working in the dead bark near the top of the tree.

Dendroctonus valens Lec.

Rather common throughout the pine regions of the State. Especially abundant in *Pinus ponderosa* in Eastern and Central Oregon. Occasionally found at the base of the larger lodgepole pines (*P. contorta*). Noted at Corvallis, Hood River, Bend, Crescent, Sumpter, Sparta, Ashland and on the Klamath Indian Reservation. The habits of the *Dendroctonus* beetles are too well known to deserve comment here.

Dendroctonus monticolæ Hopk.

Found throughout the State in *Pinus ponderosa*, *contorta*, *monticola* and *lambertiana*, wherever these trees occur. It has caused heavy losses in Northeastern, Central and Southern Oregon.

Dendroctonus engelmanni Hopk.

This species has not heretofore been reported (in literature) from this State. The author collected two dead adults from their characteristic mines under the bark of *Picea engelmanni* near Sumpter, in the Blue Mountain Region of Northeastern Oregon.

Dendroctonus brevicomis Lec.

This is the most serious pest of pine in this State, and causes the death of a very large amount of the largest and finest yellow pine (*P. ponderosa*) timber of Eastern, Central and Southern Oregon. Thousands of dollars are being expended annually in combating the pest.

Dendroctonus pseudotsugæ Hopk.

Found in all parts of the State where Douglas fir grows. The beetles seem to prefer dying, injured or down timber, but will attack living, healthy trees as shown by a serious infestation in Southern Washington and near White Pine, Oregon, where several thousand trees were killed.

Dendroctonus obesus Mannh.

A rather rare beetle working in the cambium of Sitka spruce, *Picea sitchensis*, noted at Marshfield and Astoria.

Dendroctonus jeffreyi Hopk.

This species is reported by Dr. Hopkins as occurring in Southwestern Oregon. I have seen no specimens collected in this State.

Dolurgus pumilus Mannh.

Oregon (Swaine 1908) in *Picea sitchensis*.

Dryocoetes autographus Ratz.

A number of specimens referred to this species were collected near Detroit, Oregon, from the bark of large Douglas fir windfalls.

Dryocoetes pseudotsugæ Swaine.

- This species is not uncommon in the western part of the State. At Ranier the adults were found in January, crowded into hibernation galleries in the outer bark of Douglas fir. In December near Olney they were found under the bark of a Douglas fir stump, when the bark was removed, the larvæ were found to be actually floating in water. Specimens brought into the laboratory matured, thus showing that they have adapted themselves to the extremely wet winters of that section. Also noted at Corvallis and Detroit, Oregon.

Eccoptyogaster unispinosus Lec.

A species widely distributed in the State, works in Larch (*Larix occidentalis*), Douglas fir (*Pseudotsuga taxifolia*), and Engelmann Spruce (*Picea engelmanni*). It is not uncommon in the thin bark of Douglas fir saplings, and limbs of older trees. It was recently bred from thick bark taken from near the base of a large tree, here the species evidently spent its full life cycle in the bark never reaching the cambium. It often causes the death of saplings and young poles.

Eccoptyogaster, n. sp.

A species resembling *unispinosus* in size and form but differing in the spines was taken in numbers from the twigs of a dying Grand fir (*Abies grandis*) at Corvallis, in September, 1916.

Eccoptyogaster subscaber Lec.

Found throughout the State working in *Abies*, especially *A. grandis*. The adult makes a short transverse gallery from 1 to 3 inches long; 30 to 50 eggs are deposited, and the larvæ work up and down the tree. (They are doing considerable damage at Klamath Lake in white firs). These larval mines are often a foot long; the pupal cells may be wholly in the bark, wholly in the wood, or partly in each. It is not unusual to find a tree so heavily attacked that it would be impossible to find a square inch free from mines. Larva, pupa and adults were taken at Ashland, Oregon, June 21, 1916.

Gnathotrichus sulcatus Lec.

Common in dying trees, especially in the western portions of the State. This ambrosia beetle has been taken from *Abies grandis*, *A. nobilis*, *Pseudotsuga taxifolia* and *Tsuga heterophylla*. Noted at Corvallis, Detroit, Astoria, and in the Blue Mountain Region.

Gnathotrichus retusus Lec.

A similar species found in *Tsuga heterophylla*, *Pinus contorta*, *P. ponderosa* and *Pseudotsuga taxifolia*. Most abundant in the Coast Range and Blue Mountains.

Gnathotrichus sp.

A species which I am unable to place among the described species was taken from Alder (*Alnus oregona*) at Florence, Oregon, in April, 1914.

Gnathotrichus sp.

A species similar to the last was taken from a healthy maple (*Acer macrophyllum*) at Corvallis, Oregon, in May, 1916.

Hylastinus obscurus Mannh.

The common clover root-borer is found in both Eastern and Western Oregon.

Hylesinus aculeatus Say.

Not abundant but is found attacking *Fraxinus oregona* in the western valleys. The work of this beetle often presents a masterpiece of wood engraving. The adult and larval mines are often as perfect and symmetrical as if done by the hand of an expert engraver.

Hylesinus aspericollis Lec.

A rather common species attacking living and dying alder (*Alnus oregona*). It usually selects young trees, but in the late summer of 1914 the author collected a number of adults from newly made burrows on large limbs of old trees near Breitenbush Hot Springs, Oregon. They worked in pairs, each helping in the excavation. In August many of the burrows were just being started. Noted at Florence and Corvallis, Oregon.

Hylesinus granulatus Lec.

Collected from *Abies grandis* in Blue Mountains of Oregon, in July, 1914.

Hylesinus dentatus Lec.

Rare, found in *Juniperus occidentalis*.

Hylesinus imperialis Lec.

Rare, Corvallis, May and September.

Hylurgops rugipennis Mannh.

Large numbers of these beetles were collected under the bark of a large, dead white pine (*Pinus monticola*) in the Santiam National Forest. August 21, 1914.

Hylurgops subcostulatus Mannh.

A decidedly secondary pest, entering dying or dead *Pinus ponderosa* after other Scolytids have started their work, occurring in large numbers at times. They were found especially numerous in the yellow pine of the Blue Mountain Region.

Hylurgops lecontei Swaine.

A species similar to *subcostulatus* occurring in yellow and lodge-

pole pine in the eastern portion of the State, and in the coast variety of *Pinus contorta* near the mouth of the Siuslaw River. *Hylurgops pinifex* Fitch.

Reported from Oregon by Dr. Leconte.

Ips. emarginatus Lec.

These large *Ipidæ* attack the cambium of the lower and middle trunk of *Pinus ponderosa* and *P. contorta*. They excavate large mines, running parallel with the grain of the wood, often cutting through the mines of *D. valens*, *monticola*, and *brevicomis* with which they associate. As a rule the mines are nearly straight, but at times they wind around considerably without any particular pattern. Larvæ of all stages, together with adults were collected in the Blue Mountains during June and July. They attack living, dying and recently dead trees, both standing and fallen.

Ips, n. sp.

A species allied to Leconte's *balsameus* was collected from dead *Pinus ponderosa* at Hood River, in August, by Mr. LeRoy Childs. The tree had been dead at least two years. The *Ips* galleries were so cut by galleries of other beetles that it was almost impossible to get the design.

Ips latidens Lec.

Collected from *Pinus ponderosa* on Boundry Creek, Grant County, Oregon, June, 1914.

Ips radiata Hopk.

Not uncommon in *Pinus contorta* and *P. ponderosa* in the Blue Mountain Region of Eastern Oregon.

Ips rectus Lec.

I have not been able to identify this species in any of the material collected, but it is reported from Oregon by Dr. Leconte. *Ips wieslanderi* Swaine.

Collected under the bark of drying lodgepole pine (*P. contorta*) in the Whitman National Forest in July, 1914.

Ips oregona Hopk.

Large numbers of these beetles were found at Bend and Ashland attacking living, dying and recently felled yellow pine, showing a decided preference for the latter. More than one pair of adults are often found in the same gallery. Adults and eggs

were common at Bend, May 19, while larvæ and pupæ were found at Ashland, June 20. Many were found dead, imbedded in pitch on the stumps. The egg galleries are usually 7 to 8 inches long, though it is not uncommon to find them 12 to 18 inches or even more in length. These galleries are usually fairly straight, running parallel with the grain of the wood. Occasionally they are irregular, crossing and recrossing other galleries, making a complex pattern. The typical work consists of an irregular round chamber, about half an inch in diameter from which the egg galleries run up or down the tree trunk. Each female has her own gallery in which 20 to 40 eggs are deposited along the sides and carefully covered with fine borings.

Ips pini Lec.

Reported from Oregon by Leconte in 1868.

Ips interruptus Mannh.

A single specimen taken from *Picea sitchensis* at Marshfield, Oregon.

Ips interpunctatus Eich.

Collected from *Pinus contorta* on the Whitman National Forest in July, 1914.

Ips concinnus Mannh.

This species ordinarily attacks *Pinus contorta* and *Picea sitchensis*, and it was very unusual to take several adults from a fire-injured Douglas fir sapling at Astoria in April, 1915. This is probably an accidental host, and it is interesting to note that the broods failed to develop.

Ips cælatus var.

Collected from *Picea engelmanni*, Grant County, Oregon, June, 1914.

Ips confusus Lec.

Occurs in the extreme southern part of the State in pine.

Leperisinus aculeatus Lec.

A single specimen collected at Corvallis. Host not known.

Orthotomicus ornatus Swaine.

A few specimens taken from *Pinus ponderosa* on the Whitman National Forest, July, 1914.

(To be continued.)

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE APPLE MAGGOT IN BRITISH COLUMBIA.

BY R. C. TREHERNE, FIELD OFFICER, ENTOMOLOGICAL BRANCH,
DOMINION DEPARTMENT OF AGRICULTURE.

Two adult flies of the Apple Maggot or Railroad Worm, (*Rhagoletis pomonella* Walsh) were taken at Penticton, B.C., by the author on July 26th, 1916. Inasmuch as this record constitutes the first of its kind for the Province of British Columbia, and exists practically as an original record for the Pacific Coast of North America, it is of interest and of importance. I am indebted to Dr. J. M. Aldrich for his final determination of the species.

On July 26th, 1916, while visiting the orchards in the flat land lying between Okanagan Lake and Dog Lake, at a point about two miles south of Penticton, B.C., I was attracted by the appearance of some trees suffering from a pathological trouble (Baldwin Spot). While standing among the trees in the orchard I noted an adult Trypetid fly settle on a leaf. The specimen was captured in a hand net, and examination showed a strange resemblance to the Apple Maggot (*R. pomonella*). I was so struck by the resemblance that I endeavored to find other specimens. After an hour's search I was only rewarded by capturing a second adult.

The flies were later referred to Dr. C. Gordon Hewitt, who concurred as to their identity, but who suggested that they be forwarded to Dr. Aldrich for final determination. Dr. Aldrich duly certified to the fact that the specimens were adults of the Apple Maggot, *R. pomonella*.

The variety of apple tree upon which the flies were taken was the Red Astrachan variety, but examination of its fruits and the fruits of other early varieties in the vicinity, on July 26th and on a subsequent occasion in August, revealed no definite sign of larval

injury. Many early varieties of apple had been picked and shipped at the time of the second examination. Consequently this fact, coupled with the lateness of the season which was towards the end of the flight period of the adults, probably accounts for the paucity of material.

So far as the distribution of this species of fly on the Pacific coast is concerned, I am indebted to Dr. J. M. Aldrich and to Mr. Henry H. Severin for drawing my attention to some of the following records: Five specimens were collected by Mr. O. T. Baron, in the southern part of the State of California. These were described by Snow as *Rhagoletis zephyria*, n. sp., (Kansas Univ. Quart., II, No. 3, pp. 164-165) in 1894. R. W. Doane, in 1898 (Ent. News, IX, p. 69), and J. M. Aldrich in 1909, (Can. Ent., XLI, p. 69) state that *R. zephyria* is a synonym of *R. pomonella*. Since the record of 1894, apparently, no further remarks on its existence have been made in California. Dr. Aldrich further states, in correspondence, that his cards show that the insect has been recorded from the eastern slope of Colorado (Colorado Springs, Fort Collins). No information is available that the species exists in the State of Oregon, but Dr. A. L. Melander (Bull. No. 103, Wash. Agr. Exp. Sta., Dec. 1911) states that it "has been recorded as destructive along the eastern border" of the State of Washington. He remarks, however, that there is no positive evidence of its occurrence in Washington orchards.

Consequently the record for British Columbia stands very nearly as a unique one for the Pacific Coast. Fortunately it evidently does not exist in numbers at present in British Columbia, otherwise its presence would have been observed on earlier occasions. Even yet no definite form of larval injury has been observed, and the record, thus far, exists only in the form of the capture of two adult flies. It is interesting to note, however, that Mr. E. H. Strickland, Field Officer, Entomological Branch, Dominion Department of Agriculture, captured a single specimen of this fly at Lethbridge, Alta., in 1914. There is little doubt that the insect emerged from imported fruit, and as the Province of Alberta is supplied more commonly with western fruit than eastern, the record suggests an interesting probability.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

(Continued from page 308.)

Bæoneura arietina. Type.—Yellow label 1380. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Banchus caudatus. Type.—Female, yellow label 1298. 2nd Coll. Pub. Mus., Quebec.

Banchus ferrugineus. Type.—Yellow label 385. 1st Coll. Pub. Mus., Quebec.

Banchus flavovariegatus. Type.—Female, yellow label 311. 2nd Coll. Pub. Mus., Quebec. Female, yellow label 379. 1st Coll. 2 other specimens.

Banchus formidabilis. Type.—Yellow label 378. 2nd Coll. Pub. Mus., Quebec. Antennæ at apex, median tarsi at apex, right hind tarsi entirely, gone.

Banchus inermis. Type.—Female, yellow label 313. 2nd Coll. Pub. Mus., Quebec. 3 specimens in 1st Coll.

Banchus insignis. Type.—Male, yellow label 387. 1st Coll. Pub. Mus., Quebec. Right anterior tarsus, left median tarsus at 2nd joint, left hind tarsus and right at metatarsus, right median leg, broken off.

Banchus pallescens. Type.—Male, yellow label 386. 1st Coll. Pub. Mus., Quebec. Left antenna at 5th joint, left fore leg and right hind leg gone.

Banchus polychromus. Type.—Female, yellow label 1551. 2nd Coll. Pub. Mus., Quebec.

Basalys ruficornis. Type.—Yellow label 913. 2nd Coll. Pub. Mus., Quebec.

Bassus aciculatus. Type.—Female, yellow label 1565. 2nd Coll. Pub. Mus., Quebec. Lacks most of antennæ.

Bassus albicornis. Type.—Not in Pub. Mus., Quebec. unless under name, *B. orbitalis* Cress.

Bassus amœnus. Type.—Not in Pub. Mus., Quebec, unless under name, *B. orbitalis* Cress.

Bassus areolatus. Type.—Not in Pub. Mus., Quebec, unless under name, *Lampronota punctulata* Cress.

Bassus auriculatus. Type.—Not located.

Bassus belangeri. Type.—Female, yellow label 709. 2nd Coll. Pub. Mus., Quebec.

Bassus bouleti. Type.—Not in Pub. Mus., Quebec, unless under name, *Erronemus pedialis* Cress.

Bassus cingulatus. Type.—Female, yellow label 985. 2nd Coll. Pub. Mus., Quebec.

Bassus costalis. Type.—Female, yellow label 453. 2nd Coll. Pub. Mus., Quebec. Some legs gone.

Bassus cylindricus. Type.—Male, yellow label 103(s) and 1246 (Prov.) 2nd Coll. Pub. Mus., Quebec. Lacks left antenna.

Bassus dorsalis. Type.—Female, blue label 195(s); yellow label 1247. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bassus elongatus. Type.—Male, yellow label 694. 2nd Coll. Pub. Mus., Quebec.

Bassus fuscitarsus. Type.—Male, yellow label 349. 2nd Coll. Pub. Mus., Quebec.

Bassus humeralis. Type.—? yellow label 448. 1st Coll. Pub. Mus., Quebec. Abdomen wanting. Sex not determined. One male, yellow label 348, same species, in 2nd Coll. Species described from one female.

Bassus ichneumonoides. Type.—Species badly confused, impossible to choose lectotype.

Bassus longicornis. Type.—Yellow label 932. 2nd Coll. Pub. Mus., Quebec.

Bassus mellipes. Type.—Female, yellow label 1656. 2nd Coll. Pub. Mus., Quebec. Badly mounted, antennæ gone.

Bassus pallipennis. Type.—Female, yellow label 1021. 2nd Coll. Pub. Mus., Quebec.

Bassus pectoralis. Type.—Yellow label 449. 1st Coll. Pub. Mus., Quebec. Lacks abdomen and antennæ.

Bassus pulchripes. Type.—Male, yellow label 446. 1st Coll. Pub. Mus., Quebec. Lacks apex of right antenna.

Bassus saginatus. Type.—Female, yellow label 533. 2nd Coll. Pub. Mus., Quebec.

Bassus scapulatus. Type.—Female, yellow label 994. 2nd Coll. Pub. Mus., Quebec.

Blacus cuneatus. Type.—Female, yellow label 1592. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tip.

Blacus defectuosus. Type.—Female, yellow label 1287, blue label 734. 2nd Coll. Pub. Mus., Quebec. Antennæ broken about 10th joint.

Blacus longicaudus. Type.—Yellow label 1282, blue label 710. 2nd Coll. Pub. Mus., Quebec. Head and fore legs missing.

Blennocampa paupera.—See *Selandria*.

Blepharipus cinctipes. Type.—Male, yellow label 957. 2nd Coll. Pub. Mus., Quebec.

Blepharipus nigricornis. Type.—Male, yellow label 1448. 2nd Coll. Pub. Mus., Quebec.

Brachistes crassigaster.—See *Calyptus*.

Brachistes submucronatus.—See *Calyptus*.

Bracon æqualis. Type.—Female, yellow label 551. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bracon angelesius. Type.—Female, blue label K(s), white label 25(s), yellow label 1486. Head and wings except left hind wing, gone.

Bracon apicatus. Type.—Female, yellow label 554. 2nd Coll. Pub. Mus., Quebec. Lacks ovipositor, apices of antennæ and some tarsi.

Bracon auripes. Type.—Female, blue label 670, yellow label 1571. 2nd Coll. Pub. Mus., Quebec. Right wings and head gone.

Bracon inquisitor. Type.—Female, yellow label 536. 2nd Coll. Pub. Mus., Quebec. Lacks flagella and right wings.

Bracon lævis. Type.—Female, yellow label 537. 2nd Coll. Pub. Mus., Quebec. Lacks flagella and left wings.

Bracon longicaudis. Type.—Yellow label 602. 2nd Coll. Pub. Mus., Quebec. Two specimens on same pin, top one female lacks antennæ, other one probably male, lacks abdomen and part of antennæ.

Bracon lutus. Type.—Yellow label 552. 2nd Coll. Pub. Mus., Quebec.

Bracon nanus. Type.—Female, yellow label 725. 2nd Coll. Pub. Mus., Quebec.

Bracon nigripectus. Type.—Female, yellow label 553. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bracon nigripes. Type.—Female, yellow label 1261. 2nd Coll. Pub. Mus., Quebec.

Bracon nitidus. Type.—Male not in Coll. Female, allotype, yellow label 1026. 2nd Coll. Pub. Mus., Quebec. Female, paratype, yellow label 104. 2nd Coll. Pub. Mus., Quebec.

Bracon obliquus. Type.—Female, yellow label 541. 2nd Coll. Pub. Mus., Quebec. Dirty.

Bracon ornatus.—See *Iphiaulax*.

Bracon pilosipes.—Type.—Male, yellow label 1655, (also round, faded orange disk). 2nd Coll. Pub. Mus., Quebec.

Bracon politus. Type.—Cat. No. 1969, U. S. N. M.

Bracon pygmæus. Type.—Female, mica tag, yellow label 555. 2nd Coll. Pub. Mus., Quebec.

Bracon rufovariegatus. Type.—Male, yellow label 605. 2nd Coll. Pub. Mus., Quebec. Female allotype without label.

Bracon sanguineus. Type.—Cat. No. 1968, U. S. N. M.

Bracon striatus. Type.—Male, yellow label 724. 2nd Coll. Pub. Mus., Quebec.

Callimome fagopirum. Type.—Yellow label 917. 2nd Coll. Pub. Mus., Quebec. Fair.

Callimome longicauda. Type.—Yellow label 1019. 2nd Coll. Pub. Mus., Quebec. Fair.

Calyptus crassigaster. Type.—Female, yellow label 1300. 2nd Coll. Pub. Mus., Quebec. Dirty.

Calyptus submucronatus. Allotype.—Female, yellow label 569. 2nd Coll. Pub. Mus., Quebec. Antennæ missing. Type male not located.

Campoplex carinatus. Type.—Female, yellow label 294. 2nd Coll. Pub. Mus., Quebec.

Campoplex flavipennis. Type.—Not in Pub. Mus., Quebec, unless under *Ophleates glaucopterus* Linn. Three specimens 2nd Coll., 2 in 1st Coll.

Campoplex lucens.—See *Mesoleptus*.

Campoplex luctuosus. Type.—Female, yellow label 335. 1st Coll. Pub. Mus., Quebec. Head and left fore leg entirely gone.

Campoplex marginatus.—See *Limnerium*.

Campoplex minor. Type.—Female, yellow label 293. 2nd Coll. Pub. Mus., Quebec. Antennæ gone.

Campoplex niger. Type.—Female, yellow label 1220. 2nd Coll. Pub. Mus., Quebec. Badly broken.

Campoplex nigripes. Type.—Not in Pub. Mus., Quebec, unless under *C. laticinctus* Cress. Female, 2nd Coll., female 1st Coll.

Campoplex politus.—See *Exolytus*.

Campoplex scularius. Type.—Female, yellow label 1219. 2nd Coll. Pub. Mus., Quebec.

Campoplex semirufus. Type.—Female, yellow label 1024. 2nd Coll. Pub. Mus. Quebec. Antennæ, one at scape, the left at 3rd joint, middle tarsi at 2nd joint, right hind tarsus and last joint of left hind tarsus gone; abdomen broken off, stuck on pin below specimen. Allotype not located.

Campoplex unicolor.—See *Mesoleptus uniformis* Prov.

Campoplex vicinus. Type.—Female, yellow label 291. 2nd Coll. Pub. Mus., Quebec.

Camptotera clavata. Type.—Not at present in Coll. Sent to Girault, June, 1911.

Capitonijs rubriceps. Type.—Female, blue label 721(s), yellow label 1279. 2nd Coll. Pub. Mus., Quebec.

Capitonijs rugosus. Type.—Female Cat. No. 21433 U.S. N.M. Lacks fore wings and antennæ. Male, allotype, blue label 606, yellow label 1255. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left antenna.

Centeterus tuberculifrons. Type.—Female, yellow label 249. 1st Coll. Pub. Mus., Quebec. Some verdigris.

Cephus bicinctus.—See *Phyllæcus*.

Cephus interruptus. Type.—Female, yellow label 1542. 2nd Coll. Pub. Mus., Quebec. Head gone.

Ceratosoma rufus. Type.—Female, yellow label 377. 1st Coll. Pub. Mus., Quebec. Antennæ broken at apex.

Cerceris æqualis. Type.—Cat. No. 1974 U. S. N. M.

Ceropales minima. Type.—Male, blue label 124(s), yellow label 1420. 2nd Coll. Pub. Mus., Quebec.

Ceropales superba. Type.—Harrington Coll. Paratype, yellow label 766. 2nd Coll. Pub. Mus., Quebec.

Ceroptres dorsalis. Type.—White label 56; white label 71(s); yellow label 1595. 2nd Coll. Pub. Mus., Quebec.

Charitopus facialis. Type.—Harrington Coll.

Charops fuscipennis. Type.—Female, Cat. No. 1967 U. S. Nat. Mus. Right antenna broken; right hind tarsi gone; right wings glued on label.

Chelonus argentifrons. Type.—Male, yellow label 1304. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Chelonus basicinctus. Type.—Female, yellow label 906. 2nd Coll. Pub. Mus., Quebec. Left flagellum and apex of right gone.

Chelonus carinatus. Type.—Female, yellow label 907. 2nd Coll. Pub. Mus. Quebec., Apex of left antenna gone. Specimen rather dirty.

Chelonus fissus. Type.—Male, yellow label 598. 2nd Coll. Pub. Mus., Quebec.

Chelonus nanus. Type.—Male, yellow label 908. 2nd Coll. Pub. Mus., Quebec.

Chelonus rufiscapus. Type.—Female, yellow label 1303. 2nd Coll. Pub. Mus., Quebec.

Chiloneurus maculatipennis. Type.—Harrington Coll.

Chorinæus pulchripes. Type.—Female, yellow label 1025. 2nd Coll. Pub. Mus., Quebec.

Chrysis aurichalcea. Type.—Not located.

Chrysocharis viridis. Type.—Harrington Coll. Fair.

Cinctus nasutus. Type.—Blue label 769; yellow label 1328. 2nd Coll. Pub. Mus., Quebec.

Cleonymus superbus. Type.—Yellow label 1601. 2nd Coll. Pub. Mus., Quebec. Fair.

Cleptes americana. (preoc.) = *provancheri* Aaron. Type.—Not in Quebec. May be in Philadelphia.

Clistopyga canadensis. Type.—Female, yellow label 396. 2nd Coll. Pub. Mus., Quebec.

Clistopyga truncata. Type.—Female, yellow label 1001. 2nd Coll. Pub. Mus., Quebec.

(To be continued.)

NEW NORTH AMERICAN SPECIES OF DOLICHOPODIDÆ
(DIPTERA).

BY M. C. VAN DUZEE, BUFFALO, N. Y.

Sympycnus fasciventris, n. sp.

Runs in the table of species in the Entomological News, Vol. 24, p. 270 to No. 10 where it would form a third item which would read: "Whole of hind tibiae and base of hind tarsi yellowish."

Male.—Length 3 mm. Eyes meeting on the face, leaving only a long, slender triangle below the antennae which is covered with white pollen; palpi small, whitish; front wide, brown, covered with gray pollen; cilia of the lower orbits short, black; antennae (Fig. 28,A) black, first and second joints short and with the usual bristles at tip of second joint, the longest about equal to the length of the joint; third joint fully as long as the first two together, triangular, with a sharp point, about twice as long as the width at base, fringed with rather long, crooked hairs; arista inserted near the base, pubescent, nearly twice as long as the antennae; eyes pubescent. Thorax rather pale brown with grayish pollen,

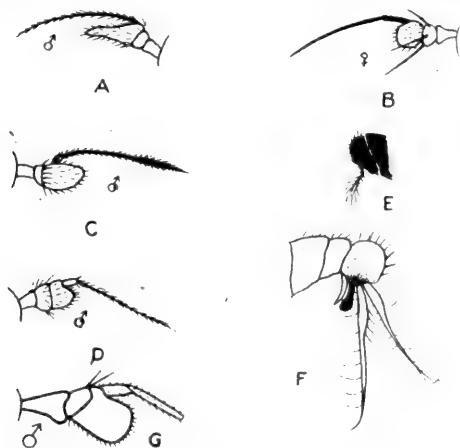


Fig. 28—A. *Sympycnus fasciventris* sp. nov., antenna of male.
 B. *Nothosympycnus inornatus* sp. nov., antenna of female.
 C. *Nothosympycnus inornatus* sp. nov., antenna of male.
 D. *Sympycnus caudatus* sp. nov., antenna of male.
 E. *Sympycnus lineatus* Loew, hypopygium.
 F. *Sympycnus caudatus* sp. nov., hypopygium.
 G. *Nothosympycnus abbreviatus* sp. nov., antenna.

which is thickest on the pleuræ, sides of the dorsum and space before the scutellum; scutellum slightly darker than the dorsum, and with two strong bristles inserted at the sides. Abdomen bronze brown, shining, with the apical half of segments three to six pale verdigris-green, first and second segments of the same colour on the sides, the green nearly meeting on the dorsum of the second along the hind margin; venter dark brown, paler towards the base; hairs of the abdomen black except a few on the sides of the first and second segments; hypopygium small, forming a rounded tip to the abdomen and without visible appendages. Fore coxæ yellow with abundant, rather long, pale hairs on the front surface; middle and hind coxæ black with yellow tips, hind pair with a pale bristle and two pale hairs on the outer surface, middle pair with pale hairs. Legs yellow; hind femora darker above; fore tarsi short, scarcely as long as their tibiæ, darkened towards the apex, last two joints black; fore pulvilli enlarged; middle tarsi slender, a little longer than their tibiæ; middle tibiæ with two bristles near the base and one near apical third; hind tarsi stout, infuscated from the tip of the second joint, about four-fifths as long as their tibiæ, first and second joints subequal. Halteres and tegulæ pale yellow, tegular cilia pale. Wings grayish hyaline with the fourth vein ending in the apex of the wing.

Described from a single male taken at Fulton, St. Cruz Mts., Cal., (300 feet), May, by Dr. J. C. Bradley.

Type in the Cornell University collection.

The wings in the type are in very poor condition. The species can easily be recognized by the slender third antennal joint, small hypopygium with its small appendages, and the colour of the feet.

***Sympycnus caudatus*, n. sp.**

Runs in the keys to N. Am. species to *S. lineatus* Loew, but is distinguished by the longer hypopygial appendages, colour of the thorax and the modified fore tarsi. (Fig. 28, E, *lineatus*; F, *caudatus*.)

Male.—Length 2–3 mm. Eyes meeting so as to obliterate the face; antennæ (Fig. 28, D) small, first and second joints yellowish, third joint black, slightly pointed, scarcely as long as wide; arista dorsal, inserted near the base of the third joint, rather long and

slender, pubescent; front and thorax bronze brown, shining, slightly dulled with brown pollen; pleuræ with whitish pollen. Abdomen dark bronze brown with more or less purple reflections towards the tip; venter yellowish, which colour extends more or less to the dorsum at the base; hypopygium brown, rounded and conspicuous, with minute white pubescence and a few black bristles; outer appendages long yellow filaments which are ciliate with long hairs placed at regular intervals (F), inner appendages black, club-shaped. Fore coxæ yellow, nearly bare but with a few bristles near the tip; middle and hind coxæ black with the extreme tips yellow; legs yellow; last three joints of fore and hind tarsi and the middle tarsi from the tip of the first joint infuscated; hind femora more or less darkened at the tip; first joint of fore tarsi about as long as the remaining four and with several bristles towards the tip, second joint longer than any of the following, enlarged below, last three joints of nearly equal length, third joint contracted at base; fore pulvilli not enlarged; middle tarsi slender, about one and one-half times as long as their tibiae; first joint distinctly shorter than the four remaining joints together; first joint of hind tarsi shorter than the second. Halteres yellow; cilia of the tegulæ pale. Wings brownish hyaline; fourth vein ending in the apex of the wing.

Described from six males from Wild Cat Canyon, San Pablo, Contra Costa Co., Cal., taken Nov. 16th by J. C. Bradley.

Type in the Cornell University collection.

***Sympycnus canadensis*, n. sp.**

Male.—Length 2 mm., length of wing the same. Face silvery white, black just below the antennæ, rather wide for a male, narrowed below; palpi brown; front almost black with violet reflections, shining; antennæ black, third joint triangular, as long as the width at base; arista dorsal, pubescent. Thoracic dorsum violet in the centre, more coppery on the sides with considerable brown pollen on the front sides, and with a large, velvety black spot on each side above and in front of the root of the wings, the sloping posterior portion and the scutellum bright green; pleuræ blackish with gray pollen. Abdomen dark green, shining, with the venter and most of the second and third segments yellow,

clothed with pale hairs; hypopygium small, black with small, black lamellæ. Coxæ and legs yellow; top edge of hind femora on apical half, hind tibiæ and tarsi wholly and last two joints of fore and middle tarsi black; fore coxæ with prominent black bristles on the front surface; middle and hind coxæ each with a large, black bristle on the outer side; fore tibiæ with a bristle on top near the base and several small ones; middle and hind tibiæ each with two bristles on top, one at basal fourth and one near the middle, and several at tip; fore tarsi a little longer than their tibiæ, the first joint nearly as long as the remaining four together, second a little longer than the third, fourth and fifth about equal in length; pulvilli not at all enlarged; middle tarsi as long as their tibiæ; hind tarsi shorter than their tibiæ, the first joint very little shorter than the second. Tegulæ, their cilia and the halters yellow. Wings grayish hyaline, rather dark; fourth vein ending in the apex of the wing; posterior cross-vein nearly three times its length from the tip of the fifth vein; veins black.

Described from two males which I took at Ft. Erie, Ont., June 6th. Type in the author's collection.

This species would run in the table of species in the Ent. News, Vol. 24, p. 270, to *S. angustipennis* Ald., but that species has yellow antennæ, yellow appendages to the hypopygium, and has the legs and feet entirely yellow except the last tarsal joint.

Nothosympycnus inornatus, n. sp.

Male.—Length 2.5–3 mm. Face very narrow, covered with gray pollen; front and thorax metallic brown with a greenish lustre and dulled with yellowish brown pollen; antennæ (Fig. 28, C) black, third joint large, oval, rounded at tip; arista inserted near the base of the third joint and thickened towards the apex, pubescent; scutellum blue-green. Abdomen shining black on the dorsum, especially towards the apex; venter yellow, which colour extends more or less to the dorsum at the base; hypopygium small, black, its appendages inconspicuous. Fore coxæ yellow with yellow hairs towards their tips; hind coxæ with a pale bristle on the outer side. Legs yellow, hind femora and tibiæ darkened at tips; tarsi becoming black towards their tips; first joint of fore tarsi very short, not much longer than thick, second joint three-

fourths as long as the tibiae and nearly as long as the third and fourth together, third and fourth of equal length, fifth distinctly shorter than fourth; middle tibiae with several slender bristles (the specimens before me have from one to four, they seem to be easily broken off); middle tarsi about as long as their tibiae, the first joint longer than the remaining four, second nearly as long as the three following and distinctly widened at tip, third and fourth about equal in length and somewhat widened, fifth slender, nearly as long as the preceding two together; hind tarsi scarcely as long as their tibiae. Tegulae, their cilia, and the halteres yellow. Wings brownish hyaline; fourth vein ends in the apex of the wing; anal angle prominent.

Female.—Face wide; thorax more opaque brown; third antennal joint (Fig. 28,B) smaller, about as long as broad, rounded at tip; middle tibiae with several bristles as in the male.

Described from seven males and several females taken by J. C. Bradley, in Wild Cat Cn., San Pablo, Contra Costa Co., Cal., May 20th–25th.

This is very much like *vegetus* Wheeler but the thickening of the arista is not close to the tip as in that species, nor so conspicuous; the relative lengths of the joints of the fore tarsi are also different, and the anal angle of the wing is more prominent.

Nothosympycnus abbreviatus, n. sp.

Male.—Length 3 mm. Face narrow with silvery white pollen; palpi yellowish; proboscis brown; front bluish but thickly covered with brown pollen so as to conceal the ground colour except on the sides; antennae brown, third joint about as long as wide, somewhat rounded at tip; (Fig. 28, G) arista very short, blunt at tip, scarcely as long as the antennae (apparently broken off). Thorax brown, nearly opaque; pleurae black. Abdomen yellowish above at base, beyond the hind margin of the second segment it is black above, somewhat bronzed at tip; venter yellow which colour extends up on the sides of the third and fourth segments; hypopygium and its appendages small. Coxae yellow; fore pair with a silvery lustre and minute pale hairs on the front surface and a few yellowish bristles at tip; middle and hind coxae with a black bristle on the outer surface; femora yellow, the hind pair darkened above at

tip; middle and hind femora each with a small bristle close to the apex; tibiae pale yellow, the posterior pair darkened at tip and with a very slender but rather long bristle below just before the basal third and several other small bristles; middle tibiae with two bristles; fore tarsi yellow, darkened towards the tip, first joint not longer than thick, second joint more than half as long as the tibiae, third a little longer than the fourth, fourth scarcely longer than the fifth; hind tarsi blackened from the tip of the first joint which is shorter than the second. Halteres yellow. Wings grayish hyaline, rather narrow at base; fourth vein ending in the apex of the wing; last section of fifth vein three times as long as the cross-vein; veins yellowish brown, costa darker.

Described from one male taken in Douglas Co., Kansas. Type in the collection of the University of Kansas.

This is one of a group of four species which are somewhat related, the antennae being formed about alike in all. The third joint of this species is a little wider in proportion than in the others and the apex more flattened, giving it a quadrate appearance, and the arista is short and blunt (if it has not been broken off). In *frontalis* Loew the arista is slender and tapers to a point; in *vegetus* Wheeler it terminates in a very small lamel, while in *inornatus*, n. sp., it is gradually thickened but still ends in a point. In *frontalis* the fourth joint of the fore tarsi is longer than the third, in *vegetus* the joints of fore tarsi are of decreasing length from the second to the fifth, in *abbreviatus* the third is longer than the fourth but the fifth is not much shorter than the fourth, while in *inornatus* the third and fourth are of nearly equal length, and the fifth is distinctly shorter.

THE SPECIES OF ARGYNNIS IN AMERICA.

BY HENRY SKINNER, PHILADELPHIA.

Recently I received a letter from Mr. Charles Oberthür, of France, in which he says: "In the European collections there is a great perturbation and confusion in the knowledge and determination of the American species of the genus *Argynnis*. The light is very desirable but hard to obtain." The European entomologists are not alone in finding our species extremely difficult, as

they are extremely difficult for us. Confusion has arisen from synonymy, loss of types and lack of knowledge as to what is a species or variety in the genus, lack of accurate data, types not fixed or inaccurately fixed, plastic or variable forms, and specimens only accidentally received through the wanderings of collectors or the accidental habitat of collectors. There are some things that must be done before we can come to a rational understanding of these butterflies. First—a single specimen must be fixed as a type to establish the correct name each species or variety is to bear. Second—to delimit the range of variation of each species. To do this large series must be studied, and they should have exact locality, date of capture and altitude where taken.

Herman Strecker¹ pointed out the difficulties in 1878. He had an excellent idea of the specific relationships of the forms or species.

H. J. Elwes² wrote a revision of the species of the world in 1889, and related his experience in trying to get some rational idea of the American species.

Wm. H. Edwards³ wrote a reply and gave notes on the above revision, and a perusal of both articles gives one an idea of the great confusion and difference of opinion in regard to these insects.

A. J. Snyder⁴ in 1900, wrote a revision of our American species, and gave some valuable information in relation to the forms of *eurynome* Edw., derived from extensive field work in Utah and Colorado.

Dr. W. J. Holland gave a series of exceedingly useful illustrations in the *Butterfly Book*, but in many instances only figured the upper sides of the species, and there is no way of telling whether they represent types or the contrary.

W. G. Wright, in his *Butterflies of the West Coast*, figures many species, but many of his determinations are erroneous and only lead to confusion.

Mr. Charles Oberthür, in his *Études Sèp. Comparée* has given some beautiful figures of the Boisduval species and has

1. Beetles and Moths of N. Am., 1878, p. 118.
2. Trans. Ent. Soc., London, 1889, p. 535.
3. Can. Ent., 1890, p. 81.
4. Occasional Memoirs, Chicago Ent. Soc., 1900, p. 27.

helped disentangle the great confusion in the Californian species. Dr. Barnes and McDunnough, in their contributions, have added much to our knowledge of some of the species.

There are some things that are imperatively necessary. A single type (holotype) should be fixed for all of Edwards' species in Dr. Holland's collection in the Carnegie Museum in Pittsburg, and these should be selected in relation to the type locations and specimens mentioned in the original descriptions. Strecker says that Dr. Behr sent him the types of *coronis*, *montivaga*, *rupestris* and *monticola*. Single types should be selected for these four species. The Strecker collection is in the Field Museum in Chicago. We need to know more definitely about Dr. Boisduval's types. Mr. Edwards says⁵ that all of Boisduval's types were sent to him and that they were in his collection. There are many confusing things in the literature in regard to types and other matters.

Dr. Holland says the types of *columbia* Hy. Edw. are in his collection, whereas the type or types are supposed to be in the American Museum of Natural History in New York.

The importance of single type fixation is shown by these citations. A concrete example is as follows: Mrs. Edwards says the types of *A. chitone* are from South Utah and the Weber Mountains (Can. Ent., 1890, p. 83), Drs. Barnes and McDunnough (Contributions, No. III, p. 75) say the Weber Mountain specimens, 1 ♂, 3 ♀'s, represent a different species.

It is impossible to differentiate the species of *Argynnis* from descriptions alone, as while they may have a different facies it is very difficult to describe it in words. As nearly all the species have been well figured in one place or another we can now make progress as soon as the types are fixed. The difficulty of fixing names and relationships is shown by the following names and how they should be treated: Much more depends on the views of the individual student. Are they species topomorphs, varieties or what?—*mormonia*, *arge*, *erinna*, *bischoffi*, *opis*, *washingtonia*, *eurynome*, *clio*, *artonis*, *luskii*. There must also be plenty of other variations of these in the many mountains not yet collected in.

5. Can. Ent., 1890, p. 82.

DESCRIPTIONS OF NEW CYNIPIDÆ

BY WM. BEUTENMULLER, NEW YORK.

***Andricus castanopsidis*, sp. nov.**

Female.—Head jet black, finely wrinkled and with whitish hairs on the face. Antennæ long and slender, filiform, 14-jointed, 3rd—8th joints long, the 3rd longer than the others, 9th—14th joints short and not much thicker than the preceding joints, 1st and 2nd joints short and stout, 2nd shorter than the 1st; joints 1–8 rufous, 9–14 black. Thorax jet black and highly polished, microscopically wrinkled, under a high power lens, smooth to the naked eye, strongly arched on the summit. Parapsidal grooves broad and deep at the scutellum, gradually becoming narrower as they reach the collar. These grooves are parallel for their greater length, and converge shortly before their posterior ends. Median groove very faint and only visible in certain lights. Anterior parallel lines very fine and scarcely evident. Lateral grooves wanting. Scutellum black, reticulately rugose, with two very large, deep and glossy basal foveæ. Abdomen rufous, darker posteriorly, with the upturned sheath of ovipositor black. Legs rufous. Wings hyaline; radial area open, the subcostal vein not reaching the costa; cubitus not extending to the first cross-vein; areolet large. Length 4 mm. Antennæ 3 mm.

Gall.—On the blossoms of Western Chinquapin (*Castanopsis sempervirens* and *C. chrysophylla*) in May. Monothalamous. Brown, globular and exceedingly thin-shelled; the outer covering being skin-like. Internally it is filled with a soft, porous, pith-like substance. The round, central larval chamber is thin-shelled and firmly imbedded in the pithy part. The gall is probably green when fresh and very soft. Diameter 12–24 mm.

Habitat.—Pacific Grove, Monterey Co., Calif. (Miss Dorothy Egbert), galls and flies; Truckee, Calif. (H. G. Dyar), galls and flies, U. S. Nat. Mus.; Mt. Tamalpais, Calif. (L. H. Weld), galls; Placer, Co. (A. Koebele), galls.

A distinct species very much resembling a *Diastrophus* in general appearance. The point of attachment of the gall is very short, and when mature it drops to the ground. The male is unknown.

Andricus myrtifoliæ, sp. nov.

Female.—Pale, uniform yellowish brown, legs and antennæ paler. Head opaque and finely punctate. Antennæ 13-jointed, basal joints filiform, terminal ones stouter and much shorter. Thorax opaque, evenly and finely punctate. Parapsidal grooves fine, continuous and converging at the scutellum. Lateral grooves indistinct. Anterior parallel lines very fine. Median groove evident only for a short distance at the scutellum, wanting anteriorly. Pleuræ wholly punctate. Scutellum opaque, finely rugoso-punctate, with two broad, deep, almost contiguous, basal foveæ. Abdomen smooth and shining. Wings delicate, hyaline with the veins very faint. Radial area open at the costa. Cubitus continuous. Areolet not evident. Length 1-1.25 mm.

Gall.—In clusters on the blossoms of *Quercus myrtifolia* Monothalamous. Small, cone-shaped bodies, each containing a single larval cell. When dry the gall is dark brown or almost black. At the point of attachment it is flattened, and from this part it gradually tapers to a blunt point at the apex. Length 2.50-3 mm.

Habitat.—Jacksonville and Palat Ka, Fla. (Lewis H. Weld.) The galls of this species were collected by Mr. Weld in April, 1914, and the flies emerged in a paper package and were all dead when he unpacked his Florida material in July, 1914. Mr. Weld informs me that the galls looked about the same in colour when they were collected, but they may be greenish when they first appear. The male is black with pale, yellowish brown legs and antennæ. The latter is 15-jointed, with all the joints stouter, the 3rd excavate beneath.

Andricus gemmiformis, sp. nov.

Female.—Head black, face very finely and minutely granulate, cheeks almost smooth. Antennæ 13-jointed, brown, paler at the junctions of the joints in certain lights, four terminal joints black. Thorax rufous, with a broad, black band from the collar to a little beyond the middle, and a similar band outside the parapsidal grooves extending forward to beyond the middle. Finely and closely punctate, subopaque. Parapsidal grooves subparallel, continuous, sharply defined and not much wider apart at the

scutellum than at the collar. Lateral grooves distinct in the black area. Anterior parallel lines very narrow and not sharply defined. Median groove wanting. Scutellum rufous, rugose with two large, somewhat shining basal foveæ. Mesopleura rufous granulate. Metapleura black, smooth and shining. Abdomen globose, smooth and shining, rufous, darker dorsally. Legs rufous, posterior femora darker. Wings hyaline, veins fine. Radial area closed. Cubitus continuous. Areolet small. Length 2-2.50 mm.

Gall.—On the trunk of white oak (*Quercus alba*), May–October. Monothalamous. Green, sometimes tinged with red. Bud-shaped, elongate, pointed at the apex, thin-walled when mature and hollow inside and containing no separate larval chamber. When young it is more solid. Length 3–4 mm.

Habitat.—Fort Lee district, New Jersey; Woodlawn, New York City.

The gall is found on the trunk of large, white oak, where the same is gnarly and young shoots sprout forth. It is imbedded in a cavity and may be easily removed. The gall looks exactly like the bud of a young sprout, and may be readily mistaken for such and overlooked. I have found fully developed galls May 30th and in June, and also late in October, 1915. One female emerged in October, 1915, from a gall collected in May, 1915, and one female in May, 1916, from a gall taken in October, 1915. Mr. L. H. Weld has also taken the gall at Evanston, Illinois. The male is unknown.

***Andricus dugesi*, sp. nov.**

Female.—Head dark rufous with short, whitish hairs, face and vertex rather coarsely rugose, cheeks finely granulated. Antennæ 14-jointed, dark rufous. Thorax dark rufous, granulated with coarse, transverse wrinkles, giving the surface a rough appearance. Parapsidal grooves continuous, widely separated at the collar and converging at the scutellum, median groove continuous. Lateral grooves blackish and long. All these grooves are wrinkled. Anterior parallel lines smooth and extending to the middle of the thorax. Scutellum coarsely rugose, rufous with two large, blackish basal foveæ, almost lost in the rugosity of the surface. Pleuræ rugose. Abdomen rufous, smooth, with decumbent yellowish hairs. Legs rufous. Wings yellowish brown,

hyaline and pubescent. Veins dark brown. Radial area open, both veins very close to the costa. Cubitus continuous. Areolet very large. Length 4-5 mm.

Habitat.—Guanajuato, Mexico, Oct. 4, 1900. (A. Duges).

Allied to *Andricus cameroni* Ashmead, but differs in the larger size, the colour and sculpture of the thorax and in the wings being considerably more yellowish. It is one of the largest species of *Andricus*. The gall is not known. The types are in the U. S. Nat. Mus., and cotypes in my collection.

***Biorhiza cæpulæformis* Beutenmuller.**

When I described this species under the name *Andricus cæpulæformis* (Ent. News, Vol. XXII, 1911, p. 69), I was under the impression that the wings had not been fully developed, because the dead example was cut from a gall. Mr. Lewis H. Weld collected many of the galls at Evanston, Illinois, early in October, 1916, at the base of red oak (*Quercus rubra*) shoots growing from a stump, and sent me many examples from which I cut at least fifty fine, living females, in October, 1916. Mr. Weld's specimens issued Nov. 23-26th, so the species seems to emerge late in fall. In all these the wings are abbreviated, consequently the species must be removed from the genus *Andricus* and placed in *Biorhiza*. The head and thorax are dark rufous, and the scutellum is black. The abdomen is large, globular, smooth and highly polished, black with the sides and junctions of the segments dark rufous. The legs are very long, dark rufous with the tibiæ infuscated, as are also the femora of the hind legs. It measures from 4-5 mm., in length, and the wings 2.50 mm. It very much resembles a queen ant, but it is sluggish in habit and feigns death at the slightest touch. When cut from the gall it emits a rather strong, fragrant odor. It is a fine species and may be the alternating form of some bisexual species. Possibly *Dryophanta lanata*.

***Amphibolips nigra* Beutenmuller.**

Gall.—On the twigs of a species of oak; monothalamous; densely wooley and about the size of a small peach, and also somewhat the colour of this fruit, especially those on the trees suffering from peach-yellows, probably white when fresh and tinged with pink. It contains a hard, thick-shelled, oval cell about the size of a bean. Diameter 22-50 mm.

Habitat.—Durango, Mexico, (Dr. A. Palmer). The types are in the U. S. Nat. Mus., and cotypes in my collection. The adults emerged from January 30th to February 8th, 1897.

***Dryophanta floridensis*, sp. nov.**

Female.—Head black, evenly and finely granulate. Antennæ black, basal joints pale brown, 14-jointed. Thorax jet black, highly polished, microscopically punctate, more so anteriorly. Parapsidal grooves distinct, deep, continuous, widely apart at the collar, and about half as wide apart at the scutellum. Median groove wanting. Lateral grooves not sharply defined and scarcely evident. Anterior parallel lines not evident. Pleuræ subopaque, finely rugose, with a polished area. Scutellum black, rather strongly rugose, basal fovea large. Abdomen black, somewhat compressed, subtriangulate, smooth and polished. Legs pale brown. Wings hyaline, veins brown. Radial area closed. Cubitus continuous. Areolet minute. Length 2–2.25 mm.

Gall.—On the trunks of Spanish Oak (*Quercus digitata* and Blue Jack (*Quercus brevifolia*), that are six or more inches in diameter; in April. The gall is soft and fleshy and does not look like a gall at all. At the base of each sprout there is a rather large cell, which is covered with short, fuzzy, abortive leaflets. They occur in clumps and are dormant bud galls.

Habitat.—Ocala and Jacksonville, Florida, (Lewis H. Weld).

TWO UNNAMED CALIFORNIAN BUTTERFLIES.

BY FORDYCE GRINNELL, JR., PASADENA, CALIF.

***Strymon sylvinus desertorum* subsp. nov.**

♂.—Fore wings: upper side, mouse colour along the costal margin to below the cell, along the outer margin diminishing to the inner margin and basally where it is lightest; fulvous from the dark outer margin, fading gradually towards the base. Hind wings: upper side, light mouse colour basally and along the costal region; a darker band along the outer margin; grayish in the inner fold; a very distinct and light fulvous area in the anal region and along the outer margin diminishing towards the upper edge; two tails, black, tipped with white; fringes white. Under side: fore wings, ashy, a very faint discal spot, marginal line and row of spots barely

October, 1917

discernible, followed by a heavier row of six black dots. Hind wings with a continuation of the inner row of heavy black dots, the last two heaviest; also the first row of spots or crescents between this and the margin. A large, distinct red patch in the anal angle and a smaller patch of blue or purple scales.

♀.—Similar to the male.

Expanse 32 mm.

Types.—One male and one female in the author's collection. Eleven topotypes. One or more topotypes will be deposited in the Barnes' collection.

Habitat.—Oak Creek, Kern County, California, June 29, 1905, collected by the writer. Oak Creek "flows" from the Tehachapi Mountains into the Mojave desert. The type locality is in semi-desert conditions, but about two miles further down are true desert conditions with the characteristic tree yuccas and other desert plants.

The male specimen selected as the type was sent to Dr. McDunnough, who returned it marked "A form of *sylvinus* close to *dryope* Edw." There are two or three specimens in the series with no fulvous on the upper sides of the wings; but the very lightly marked under side and peculiar light fulvous extension on the upper side mark this as a readily distinguishable desert race.

***Glaucoopsyche behri australis*, subsp. nov.**

This Southern Californian race of *behri* (Edwards) has been generally named and distributed by collectors as *antiacis* or *polypheumus*, but as Dr. McDunnough has shown in his careful studies of Boisduval's types these names cannot hold, but are applicable to species or forms of the San Francisco Bay region. It is figured on Plate XXIX, 367, b., c., of Wright's Butterflies of the West Coast, as *antiacis*. *Australis* is very variable, much more so than *behri*, and is evidently in a comparatively rapid process of species change or formation from the probable original form of the San Francisco region with large, distinct, round, black spots, known as *behri*. The spots on the under side of the fore wing of *australis* (type) are large but run together as compared with *behri*, and with white rings; while those on the hind wing are much smaller. A surprisingly large number of specimens taken in the region of

australis show a disappearance or an approaching disappearance of the black spots, leaving only indistinct white spots in their places, or with a small, black dot in the centre. The black spots of *australis* are, also, more irregular in outline than the more circular ones of *behri*. *Behri* is much less variable.

Type.—One ♂ from Pasadena, May 20, 1907, by the writer and in his collection. Topotypes will be deposited in the Barnes' collection.

Distribution.—From Santa Barbara (extending north to Monterey County) to San Diego west of the mountains. This distinct faunal area is known as the San Diegan Faunal District. It occurs from February to June.

GEOMETRID NOTES.

A NEW SPECIES OF EUCHLÆNA.

BY L. W. SWETT, BOSTON, MASS.

***Euchlæna albertanensis*, sp. nov.**

Expanse 45 mm. Palpi, head, thorax and abdomen pale yellow ashen, primaries of the same colour. Base of primaries to basal line darker than central portion, striated with fuscous. Basal line reddish brown, making an outward curve to median vein, then running straight to inner margin. Central part paler than rest of wings, finely striated and with small, black, discal spot. Extra discal line brownish, making an outward angle below costa, then running straight to vein 3, where there is slight inward curve to inner margin. There is a faint line bordering extradiscal, which separates from it at costa and inner margin. Outer margin darker, as is base, with with pale apical streak and black spot at the end, almost opposite angle of extradiscal line. Fringe pale yellow, outer margin somewhat extended at vein 5. Secondaries same colour as primaries, only basal portion is lighter yellow. A broad, suffused, brown basal band, discal space very pale yellow and containing round, black, discal spot. Extradiscal line crosses wing at almost right angles, hardly curved. The outer brown shade line makes a projecting blunt jointed loop below discal spot. Beyond extradiscal line the wing is darker than in the centre of the wing. The fringe is the same colour as on the primaries, but there are two deep notches near veins 5 and 6. Beneath primaries

October, 1917

marked as above but not darker in basal and marginal area. Secondaries marked as above, pale yellow, with striations.

This species appears to be close to *pectinaria* Denis and Schiffermüller and its synonym *deductaria* Walker, which may be a good species and not the same as *pectinaria*. In the copies of Denis and Schiffermüller's work in the Boston Society of Natural History, I can find no figure or any description and it seems as if there may be an incorrect reference, so that *deductaria* Walker will, at least, represent an Eastern form. This species, *alberta-nensis*, is apparently not common, as Mr. Wolley-Dod, from whom I received the type, stated he had seen but few. Since then I have received other specimens from Mr. Bowman and Mr. Mackie, of Alberta.

Holotype.—♂, May 31, 1912, Calgary, Alberta, from Mr. Wolley-Dod, and in my collection.

Allotype.—♀, June 16, 1916, Edmonton, Alberta, in Mr. Bowman's collection.

Paratypes.—Two ♂'s, Edmonton, Alberta, in Mr. Mackie's collection.

THE ANTHOMYID GENUS PHYLLOGASTER.— ADDENDUM.

Since sending my paper on the Genus *Phyllogaster* to the press* I have read C. W. Johnson's paper in the April number of the Canadian Entomologist, in which he describes a new species of this genus under the name *robustus*. An examination of paratypes of *robustus* discloses the fact that in addition to the difference in size between the species and *cordyluroides*, the male may readily be separated from the latter and also from *littoralis* by the presence of a large number of strong bristles on the basal dorsal segment of the hypopygium (two in the others) and the much larger pulvilli which exceed in length that of the apical tarsal joint, whereas in the others they are much shorter than it. The female of *robustus* has two thorns on apical abdominal segment, *littoralis* has four, the female of *cordyluroides* is unknown to me. As in *cordyluroides* the third vein of the wing is bare in *robustus*.

J. R. MALLOCH.

*Can. Ent. XLIX, July, 1917, p. 227.

AN ANNOTATED LIST OF THE SCOLYTID BEETLES OF OREGON.

BY W. J. CHAMBERLIN, OREGON EXPERIMENT STATION,
CORVALLIS, ORE.

(Continued from page 328.)

Phloeosinus dentatus Say.

A single specimen collected from *Chamaecyparis nootkatensis* at Elk Lake, Oregon.

Phloeosinus punctatus Lec.

This beetle was found doing considerable damage to the juniper (*Juniperus occidentalis*) in the vicinity of Bend and Prineville, in Central Oregon. Both male and female work, excavating a short gallery $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long, running with the grain of the wood. Eggs are deposited in niches on each side of the gallery and are sealed in by a wall of frass. The young larvæ work out at more or less right angles to the egg gallery. Eggs, larvæ and pupæ were collected in early May at Bend. Completed egg galleries of the same species were found in Incense cedar (*Libocedrus decurrens*), on the Klamath Indian Reservation a month later. It has been taken from its galleries in Western red cedar (*Thuja plicata*), Alaska cedar (*Chamaecyparis nootkatensis*), and Port Orford cedar, (*Chamaecyparis lawsoniana*), in the western part of the State. It probably attacks all the trees of the juniper and cedar group. The cocoons of an unidentified hymenopterous parasite were found in the mines in juniper.

Phloeosinus cristatus Lec.

This species is rare; attacks Alaska Cedar (*Chamaecyparis nootkatensis*), Noble fir (*Abies nobilis*), and Engelmann Spruce (*Picea engelmanni*).

Phloeosinus sequoia Hopk.

Occurs in *Thuja plicata* and *Sequoia sempervirens* in the southwestern portion of the State.

Pseudohylesinus nebulosus Lec.

The adults of this species emerge in March in the Willamette Valley. After emergence, no time is lost in attacking a new host. Douglas Fir is their principle host tree and living, dying or felled trees, especially in the sapling and pole stages are favourites. When

such timber is not available the limbs of larger trees are selected. The female starts the gallery and is soon followed by the male. The entrance gallery is at an oblique angle, and upon reaching the cambium a gallery is run parallel to the grain by the female. The male works in the opposite direction. The eggs are deposited in little niches chewed out by the female. The eggs hatch in 5 to 7 days and the larvæ work out at more or less right angles. Pupation takes place in the bark. The parent adults die in the mine after the eggs are deposited. In most cases the male is found blocking the entrance with his dead body, and the body of the female is found at the far end of the gallery. Observed in both Eastern and Western Oregon.

Pseudohylesinus nobilis Swaine.

This species was found entering the thick, flinty bark near the base of large, living *Abies nobilis* in the Cascade Mountains in August, 1914.

Pseudohylesinus laticollis Swaine.

Found with the above species on *Abies nobilis* and later taken from *Abies lasiocarpa*.

Pseudohylesinus, n. sp.

A very large specimen taken in the act of boring into Lebanon Cedar (*Cedrus leboni*), on the College grounds.

Pseudohylesinus undescribed species allied to *nebulosus* Lec.

A number of specimens in the collection taken at Elkton, Oregon. February 16, 1896. No host given.

Pseudohylesinus griseus Swaine.

This species is less common than *P. nebulosus*, but in habits, life history, etc., is very similar. Found attacking Douglas fir at Breitenbush Hotsprings in the Cascade Mountains in April.

Pseudohylesinus sericeus Mannh.

Very similar to last two. Bred in numbers from Douglas fir collected at Corvallis, Astoria, and Detroit, Oregon.

Pseudohylesinus sericeus var.

A species differing considerably in size and markings. It was bred from Douglas fir at Corvallis in August.

Pityophthorus pubipennis Lec.

Occurs abundantly in Ash (*Fraxinus oregona*) and Oak (*Quercus gerryana*) in the western valleys.

Pityophthorus puncticollis Lec.

Occasionally met with in spruce (*Picea sitchensis*) and in *Pinus contorta*.

Pityoktaines jasperi Swaine.

I have two specimens of this insect as determined by Professor Swaine. One taken from *Abies grandis* and the other from *Abies lasiocarpa* near Sumpter, Oregon, July, 1914.

Procryphalus aceris Hopk.

Type taken from *Acer macrophyllum* at Albany, Oregon. April 28, 1899. Hopkins.

Tomicus (Hylastes) nigrinus Mannh.

Taken from Douglas fir at Corvallis, Ranier, Astoria and Svensen, Oregon.

Pityogenes carinulatus Lec.

A small species found girdling and killing twigs and small branches, $\frac{1}{8}$ to 1 inch in diameter. Occasionally larger limbs were found attacked. Living, dying and felled yellow pine (*Pinus ponderosa*) was found attacked at Bend, Oregon, in May. A rough circular chamber $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter is eaten out, from this radiate 5 to 8 egg galleries $\frac{1}{2}$ to $1\frac{1}{2}$ inches long. The eggs are pearly white, slightly less than 1 mm. long, oval, buried in the frass. Adults, young larvæ and eggs were collected May 19, 1916.

Pityophthorus confusus Lec.

Swaine (N. Y. S. Mus. Bul. 134) gives the range of this species as transcontinental and gives Washington and California, so the species undoubtedly occurs in Oregon, though I have never collected it.

Pityophthorus confertus Swaine.

Bred from pine cones collected at West Port, Oregon. Cones collected August 20, and adults emerged September 11.

Pityophthorus nitidulus Mannh.

A widely distributed species which is found in dying *Pinus*, *Picea* and *Pseudotsuga*, throughout the State.

Pityophthorus, n. sp.

A species similar to *nitidulus* but larger and darker has been collected a number of times from *Abies grandis* and *Abies nobilis*; from the former tree in the valleys, from *nobilis* in the Cascades.

Trypodendron (Xyloterus) lineatus Oliver.

The true *lineatus* seems to be very rare, though a closely allied species is common. I have what I believe to be the true species from Seaside, Oregon. They were picked up on the beach during a storm in December, 1916.

Trypodendron (Xyloterus) politus Say.

There is a single specimen in the College collection bearing the label "Huntington, Oregon." Probably erroneously labeled. *Trypodendron rufitarsis* Kirby.

A number of specimens collected from *Pinus contorta*, near Sumpter, Oregon, July 14, 1914.

Trypodendron, n. sp., near *rufitarsis*.

Collected from living Douglas fir at Breitenbush Hot Springs, April and August, 1914.

Xyleborus dispar Fabr.

In orchard trees; Portland, Salem, Corvallis, Oregon City, and Eugene; April to June.

Xyleborus xylographus Say.

Specimens assigned to this species taken from Oak (*Quercus gerryana*) and Douglas Fir (*Pseudotsuga taxifolia*) at Corvallis. *Platypus wilsoni* Swaine.

Abies grandis, Corvallis; *A. nobilis*, Elk Lake; *Tsuga heterophylla*, Detroit, and *Pseudotsuga taxifolia* at Corvallis and Ranier.

Editor's note.—Mr. J. M. Swaine has informed me that *Ips wieslanderi* Swaine, which was listed in the first part of Mr. Chamberlin's paper (p. 327) is an old manuscript name for the species described as *Ips radiata* Hopkins.

Leperisinus aculeatus Lec. (p. 328) and *Hylesinus aculeatus* Say, (p. 326), are synonymous, and should be listed under the latter name.

A NEW WEST INDIAN CHALCID-FLY.

BY A. A. GIRAULT, GLENNDALE, MD.

***Achrysocharella albitibiæ*, n. sp.**

Female.—Length 1.50 mm.

Dark metallic green, the scape, tibiæ, knees and tarsi white. Scape compressed. Funicle 2 subequal to club 3; terminal spine

October, 1917

of club subequal to club 3. Head and thorax scaly punctate, the propodeum subglabrous, also segment 2 of abdomen; rest of abdomen delicately scaly. Wings hyaline, the venation pallid yellow. Mandibles bidentate. Antennæ with two distinct ring-joints, two funicle-joints and three club-joints, the latter with a long terminal spine and the region tapering. Stigmal vein subsessile, half the length of the postmarginal, the marginal over half longer than the submarginal. Hind tibial spur short and stout. Funicle 2 quadrate, 1 somewhat longer than wide, shorter than the long pedicel. Segment 2 of abdomen occupying about a sixth of the abdomen. Propodeum noncarinate. Axillæ somewhat advanced. Parapsidal furrows slightly indicated from cephalad, subobsolete, a straight, oblique groove laterad of the spiracle. Abdomen sessile.

From a single female on a tag in the U. S. National Museum, labeled "*Nesomyia albipes* Ashmead, 242. Leeward side, St. Vincent, W. I., H. H. Smith."

Type.—Catalogue No. 20349, U. S. Nat. Museum, the specimen on a tag and a slide.

This does not appear to be the genotype of *Nesomyia* Ashmead MS., since I describe elsewhere a second species similarly labeled and belonging more properly where Ashmead assigned the genus. None of the West Indian species of *Closterocerus* belong to that genus.

ON SOME NEW AND KNOWN MELANDRYIDÆ (COL.)

BY CHARLES SCHAEFFER, BROOKLYN, N. Y.

Carebara californica, new species.

Elongate, subdepressed, brown, antennæ, palpi, legs and underside paler. Head convex with moderate punctures; antennæ about as long as head and prothorax, third joint longer than second or fourth, fifth to tenth about as long as wide and nearly equal in size but shorter than fourth, eleventh elongate oval. Prothorax wider than long, apex a little narrower than base; sides rather feebly arcuate; basal and apical angles broadly rounded; basal margin feebly arcuate; surface moderately punctate; basal foveæ feeble. Elytra about two and one-half times as long as

prothorax and not wider than the latter at base; sides feebly diverging, nearly parallel; apex broadly rounded; surface with slightly finer punctures than those on the prothorax. Under side punctured nearly like the upper side. Length 4.25 mm. Fresno Co., Cal.

This species differs from *longula* in the shape of prothorax and differently formed antennal joints. The sides of prothorax in *longula* are almost parallel, the fourth antennal joint triangular and the outer joints are wider than long; the upper surface is also more depressed in *longula* than in *californica*. *Carebara longula* was described from the Middle States and specimens taken in this neighbourhood at Wyandanch, Long Island, and Jamesbourg and Lakehurst, N. J., agree better with the description of that species than my California specimens; some of which I received from Ricksecker as *C. longula*.

Hallomenus binotatus Quens.

I have a specimen from Montreal, Canada, given me by Mr. Chas. Liebeck which agrees closely with the description of this European species. Mr. Liebeck writes me that he has received several specimens of the same species from the above mentioned locality taken at different times.

It is similar in form, size and antennal structure to *scapularis*, the colour brownish-yellow and the prothorax with two black longitudinal lines. The elytra are obsoletely striate, the prothorax more finely granulate and the basal margin more distinctly sinuate than in *scapularis*.

Scryptia oculata, new species.

Very much like *sericea* but a little more elongate, punctuation of upper surface almost the same as in that species; the second and third joints of antennæ are smaller and together not as long as the fourth joint in the male, in the female the second and third joints together are equal or nearly so to the fourth joint. The eyes are larger and separated on the front by a much smaller space than in *sericea*. The last ventral segment of the male is deeply, longitudinally impressed at middle and at apex triangularly emarginate. Length, male type, 5 mm. Huachuca Mts., Arizona.

***Allopoda lutea* Hald.**

Hallomenus fuscotuturalis Blatchl. Can. Ent. XLV, 24.

Specimens received from Prof. Blatchley of his *Hallomenus fuscotuturalis* are the same as our common *Allopoda lutea*.

***Allopoda arizonica*, new species.**

Form of *lutea* but generally of a darker and uniform colour. Head moderately coarsely punctate, punctures more closely placed than in *lutea*, eyes rather large; antennae rather longer than in *lutea*. Prothorax transverse, sides arcuately narrowing from the narrowly rounded hind angles to a little before apex and then more strongly rounded to apex; surface more closely punctate than in *lutea*. Elytra slightly wider at base than the prothorax; apices separately rounded; surface a little more closely and finely punctate than in *lutea*. Length 4 mm. Huachuca Mts., Arizona.

This species differs from *lutea* in the denser pubescence and punctuation, shorter and more transverse prothorax and relatively longer antennal joints.

***Allopoda californica*, new species.**

Narrowly elongate, rather sparsely pubescent, colour fusco-testaceous, first two joints of antennae, palpi, legs and under side paler. Head moderately closely punctate; antennae longer than the head and prothorax together, third joint not quite twice as long as second, fourth a little longer than third. Prothorax transverse, sides nearly parallel in about basal third, then rather strongly, arcuately narrowing to apex; hind angles feebly rounded; basal margin trisinate, the median sinuation stronger than on each side of middle; basal foveae distinct; surface rather finely punctured. Elytra about three times as long as the prothorax; sides feebly arcuate; apex broadly rounded; surface rather finely and moderately closely punctate. Length 4.5 mm. Tulare Co., Cal.

The type and only specimen seen is a female in the collection of the late Ottomar Dietz. It differs from *arizonica* and *lutea* in slightly larger size more elongate form, base of prothorax more distinctly trisinate and especially in the form of maxillary palpi, which are in *californica* elongate, cultriform, as in *Canifa* but it

differs from species of that genus by the very small, somewhat triangular, labial palpi and the simple, not lobed, penultimate joint of hind tarsi. It is possible that a new genus has to be erected for this species as the genera of the tribe Scaptiini are separated by the form of the last joint of maxillary palpi and the form of the penultimate joint of hind tarsi; which are lobed in *Scaptia* and *Canifa* but simple in *Allopoda* and the Central American *Evalces*.

SPECIES OF THE GENUS BRACHYOPA OF THE EASTERN UNITED STATES (DIPTERA).

BY CHARLES W. JOHNSON, BOSTON, MASS.

TABLE OF SPECIES.

- | | | |
|----|--|------------------|
| 1. | Arista microscopically pubescent..... | 2 |
| | Arista conspicuously pubescent, species yellow..... | notata O. S. |
| 2. | Species yellowish or brownish..... | 3 |
| | Species blackish..... | 5 |
| 3. | Dark brown, three thoracic lines, second abdominal
segment light yellow, somewhat translucent..... | vacua O. S. |
| | Light brown and yellow..... | 4 |
| 4. | Thorax, dorsum brown, with four black lines,
6-7 mm..... | media Will. |
| | Thorax, dorsum yellow, with four brown lines,
5 mm..... | flavescens Shan. |
| 5. | Thorax, dorsum grayish pollinose with five black
lines, abdomen entirely black..... | daeckeii, sp. n. |
| | Thorax, dorsum grayish pollinose with four black
lines and short diverse lines, abdomen black,
marked with grayish pollen..... | diversa, sp. n. |

Brachyopa daeckeii, sp. n.

Front black, grayish pollinose, a shining spot above the base of the antennae yellow, bordered with black, face below the antennae grayish pollinose, sides shining, yellow with two spots of black, antennae dark yellow, arista brown. Thorax black, grayish pollinose, with five subshining lines, the three inner ones slightly diverging but not reaching the scutellum, pleura brownish grayish pollinose, scutellum brown, the apical half much lighter than the

base. Abdomen black, shining, hairs white. Legs brown, hairs white, outer half of the posterior femora blackish, tarsi yellowish, halteres yellow. Wings hyaline, veins brown, stigma yellow, anterior cross-vein slightly clouded with brown, tegulae white. Length 6 mm.

One specimen, Castle Rock, Delaware Co., Pa., May 19, 1902, collected by Mr. V. A. E. Daecke. Type in the author's collection. This specimen has been referred to as a dark variety of *B. media* (Psyche, Vol. XVII, p. 230, 1910) but further study in connection with the following species convinces me that it is distinct. The thoracic lines and abdominal characters seem very constant in this genus.

***Brachyopa diversa*, sp. n.**

Face and front yellowish, whitish pollinose, a shining spot above the antennae and a shining brown streak across the cheek, occiput black, grayish pollinose, finely punctate, antennae dark yellow, arista black. Thorax black, brownish pollinose, with four shining black lines and short diverse lines, the two dorsal lines not reaching the scutellum, but a short median line extending forward from the scutellum, the subdorsal line interrupted by a prominent sutural line, short oblique lines extending anteriorly from the posterior ends of the subdorsal lines towards the ends of the dorsal lines, humeri and a large spot above the base of the wing shining black, pleura grayish pollinose with white hairs, scutellum dark brown. Abdomen: first segment grayish pollinose, second segment grayish pollinose except a median and large, round lateral spots of shining black, third and fourth segments shining black, excepting the posterior pollinose margins. Legs black, bases and tips of the femora and tibiae, and the tips of all of the first three tarsal joints yellowish. Halteres white, wings hyaline, veins brown, stigma yellow, anterior cross-vein and the angles of the discal cell clouded with brown, false vein prominent, extending to the end of the discal cell, apical portion of the fourth vein with two stubs, one at the obtuse angle, the other slightly anterior and extending into the first posterior cell, a stub also extending into the discal cell, tegulae white. Length 7 mm.

One specimen near Shattuck Inn, Jaffrey, N.H., June 18, 1917,

on the flowers of the choke cherry. Type in the collection of the Boston Society of Natural History.

***Brachyopa flavescens* Shannon.**

B. flavescens Shannon, Insecutor Inscitiae Menstruus, Vol. III, p. 144, 1915.

This species is closely related to *B. media* from which it can be separated only by its somewhat smaller size and lighter coloured thorax. In some specimens the anterior portion of the thorax is dark brown, strongly suggesting that it may prove to be only a variety of *B. media*.

Specimens agreeing with those from the type locality, Dead Run, Va., have been collected on the summit of Mt. Greylock, Mass., June 15, 1906, Bretton Woods, N.H., June 26, 1913, and near the Glen House, base of Mt. Washington, N.H., June 14, 1916.

***Brachyopa media* Williston.**

This widely distributed species varies considerably both in size and colour. In some specimens the legs are quite dark and the abdomen has a distinct median line. It has been collected at Bretton Woods, N.H., June 24; Glen House, N.H., June 14 and June 15, Jaffrey, N.H., June 21, 1917, and Sherborn, Mass.

BOOK NOTICES.

GUIDE TO THE INSECTS OF CONNECTICUT, PART III. The Hymenoptera or Wasp-like Insects of Connecticut. Bulletin No. 22, Connecticut Geological and Natural History Survey. By Henry Lorenz Viereck, with the collaboration of A. D. MacGillivray, C. T. Brues, W. M. Wheeler and S. A. Rohwer. 824 pp., 10 plates. Hartford, 1916. \$1.50.

This is the first attempt to present a complete systematic treatise of the Hymenoptera of any state of the Union and the State Entomologist, Dr. Britton, under whose direction the work was undertaken, as well as the various authors, deserve the thanks of the entomological public throughout North America for the admirable manner in which their work has been accomplished.

In the Introduction, by Mr. Viereck, the general characters of the order Hymenoptera are set forth and the economic significance of the various groups is discussed. The various superfamilies

are then taken up in order, each being defined and the taxonomic characters illustrated by outline figures of a typical species. Full keys are given to the families, subfamilies and genera, and in the great majority of cases also to the species, which in any case, are fully characterized. Lists of localities are given for each species, with the names of the collectors, and the names are also included of species not yet recorded from Connecticut but likely to occur there. The same general plan of treatment has been followed by the various authors though their methods differ slightly in detail.

The chief author, Mr. Viereck, is responsible for the Ichneumonoidea, Cynipoidea, Chalcidoidea, Chrysidoidea, Apoidea and part of the Vespoidea; the Tenthredinoidea are by Prof. MacGillivray, the Serphoidea and Proctotrypoidea by Mr. Brues, the Formicoidea by Prof. Wheeler, and the Sphecoidea and greater part of the Vespoidea by Mr. Rohwer.

Besides the text figures there are ten good half-tone plates from photographs, on which are illustrated typical examples of the order, including representatives of most of the superfamilies; and also various types of Hymenopterous larvæ, cocoons, nests, galls, etc.

This is a book which should be in every entomological library and will be as indispensable to the general student as Blatchley's *Coleoptera of Indiana*.

THE BLATTIDAE OF NORTH AMERICA, NORTH OF THE MEXICAN BOUNDARY. By Morgan Hebard. *Memoirs of the American Entomological Society*, Number 2. Published by the American Entomological Society at the Academy of Natural Sciences, Philadelphia, 1917. 284+vi pp., 10 plates.

Students of Orthopteroid insects will all welcome the appearance of this masterly revision of a difficult and perplexing group. While a good many papers on the North American Blattidae, or Cockroaches, have been published within recent years, we have now for the first time a comprehensive review of the entire subject from the systematic standpoint. It is in fact far more than a review, for important new characters have been brought to light, and no less than five new genera and eight new species are described. A fifth new generic name, *Parcoblatta* (= *Platamodes* Scudder,

preoccupied), is introduced to include nearly all of the native species commonly placed in *Ischnoptera*, this genus together with *Blattella* having been found to contain many valid generic units. Only one true *Ischnoptera*, *I. deropeltiformis* (Brunner), belongs to the North American fauna, while the only species of *Blattella* represented in the New World is the introduced and cosmopolitan genotype, *B. germanica* (L.).

A valuable feature of the work is the careful definition of the characters of diagnostic value, including the methods of measurement. The venational terminology, which is illustrated by a diagram of a typical blattid tegmen and wing, is that which has been commonly employed by orthopterists, but in the present writer's opinion it is somewhat to be regretted that the more generally applicable system of Comstock and Needham was not substituted.

Although detailed descriptions of genera and species have been avoided, the characters of real importance have been carefully analyzed and much attention has been given to coloration and to the range of variation in each species. The geographical distribution is also treated in great detail, the exact localities with other available data being given for all the material studied.

Forty-three species are recorded as established within the United States and of these ten are probably introduced. Species are numerous only in the limited tropical areas along the southern border of the country, rapidly diminishing northward, there being only two indigenous forms and two established adventives which are known to occur north of the Canadian boundary.

Following the descriptive account of the Blattidæ that are native or naturalized within the territory under treatment is a supplement dealing more briefly with the adventive forms, tropical cockroaches being frequently carried by commerce to more northerly localities, where they usually fail to become established. There are thirty-one species in this category, eight of which are also native in southern portions of the United States.

The extensive series of illustrations are beautifully executed drawings, which leave nothing to be desired.

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No. 11

POPULAR AND PRACTICAL ENTOMOLOGY.

GRAPHIC PRESENTATIONS OF ENTOMOLOGICAL FACTS.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

In reading over various entomological publications, one is impressed by the growing tendency of authors to present their facts where possible, in a graphic manner. In support of this statement, it is only necessary to recall in various publications, the many charts showing curves of insect activity of one sort or another. There are many entomological authors, however, who have not adopted this forward step and in support of this, one has only to remember the numerous tables of figures so often to be found.

Many readers, when they arrive at a page containing detailed information in the form of printed tables, experience a sinking sensation and unless they are especially interested in the insect or activity in question, they are inclined to pass hurriedly over this part and seek a summary if one is to be found. It is realized, of course, that many entomological facts cannot be treated graphically, but on the other hand, many can but are not and to those who are not in the habit of using illustrative charts wherever possible in their publications, this paper is intended as a slight suggestion along such lines.

Much time and money is expended in the collection of entomological data and unless this material is presented in a clear and interesting manner, the maximum amount of benefit will not be secured. Not only is time saved for the reader by graphic presentations, but the facts are put before him in such a manner that they appeal to him more strongly, he remembers them better and it is less possible for him to draw wrong conclusions when quantitative facts are placed before him in accurate proportions. Such presentations do not as a rule require as much space as printed words. They do require more work of the author, but if the data are worth

collecting at all, they are certainly worth presenting in a manner likely to convince the reader, thereby obtaining the desired results.

The scope of this paper is purely suggestive and the following figures are of the simplest. If one starts only to think of the best way to present his facts, various graphic methods will suggest themselves to him and by placing himself in the position of the readers he is trying to reach, he can decide upon the best method to use. Graphic methods are used by banking houses, corporations, railroad companies, statisticians, engineers and many others in business and professional occupations, and there

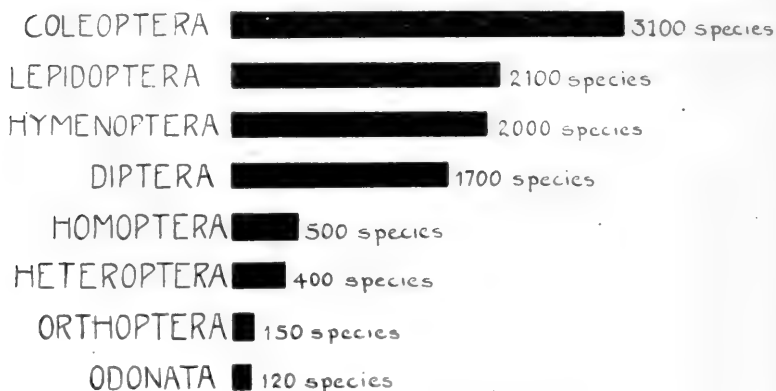
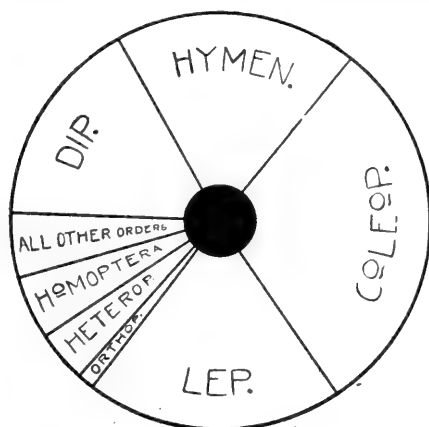


Fig. 29.—A comparison of New Jersey's Insect Orders.

is no reason why all entomologists should not use them wherever possible.

Figure 29 is a graphic comparison of the number of species of insects in some of the orders in New Jersey. Figure 30 is a similar comparison in which each order is represented by the sector of a circle. The bar method as shown in figure 29 is by far the most preferable. It is easier to read and the figures in round numbers at the right hand ends of the bars give the reader a chance to test the accuracy of the comparisons. All titles should be as full as possible and in large enough type to be easily read. Figure 30 is an example of the direct opposite of this. Many entomologists simply number their figures and have an explanation of the plate

at the end of their paper, and worse still is the practice of having the explanations scattered throughout the text. In many instances there is no real reason why the explanation and the figure



10630 SPECIES FOUND IN NEW JERSEY

Fig. 30.

should not appear on the same page. An author fails to realize that all readers do not share his burning interest in the question treated, and unless he can command their attention, sometimes in spite of themselves, he is likely to lose their interest.

Figure 31 is a bar method of comparing percentages. An illustration of this sort is easily read, and the reader can grasp readily the fact that 48 per cent. of the species of insects in New Jersey feed on vegetation and that 16 per cent. are predatory, and so on. The words "on vertebrates" should have been replaced by "injurious to vertebrates," as the former phrase is somewhat misleading. The shading of the large sections of the bar might also have been made more dense, to bring them out better. A chart of this kind is much more effective than a mere printed statement of the facts. Many readers do not grasp printed figures easily, and if you desire to reach this class you must visualize the facts for them.

Figure 32 needs practically no explanation. It is simply a graphic method of placing figures or amounts before a reader and

making them easy to compare. This chart would have been more effective and useful if the figures showing the actual amounts spent in the states had been placed at the ends of the bars, and if

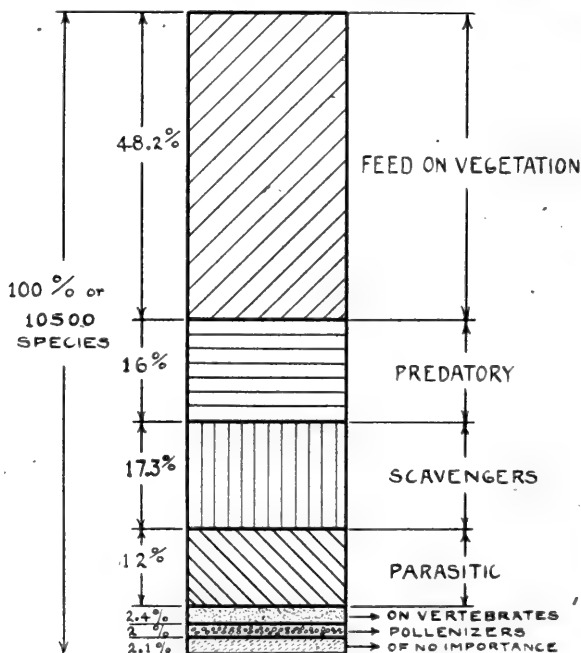


Fig. 31.—Activities of New Jersey Insects.

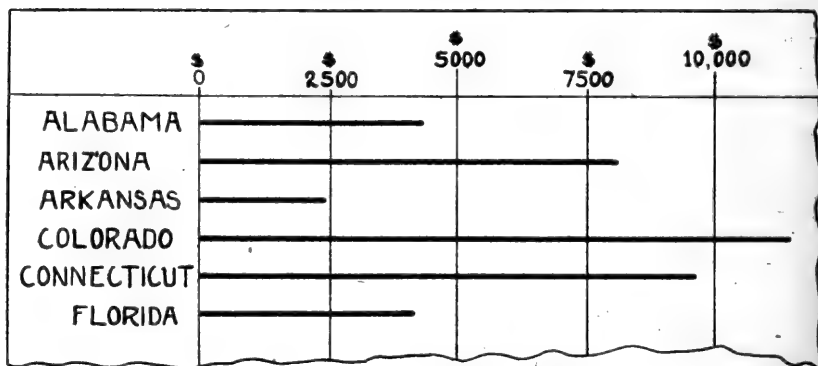


Fig. 32.—Money spent for entomological activities in 1912.

the figures in the horizontal scale were at the bottom. No importance should be attached to the amounts shown on this chart. They were taken from Prof. P. J. Parrott's paper in the Jour. Econ. Ent., Vol. 7, p. 57, simply for the purpose of illustration and should not be used without reference to Prof. Parrott's article.

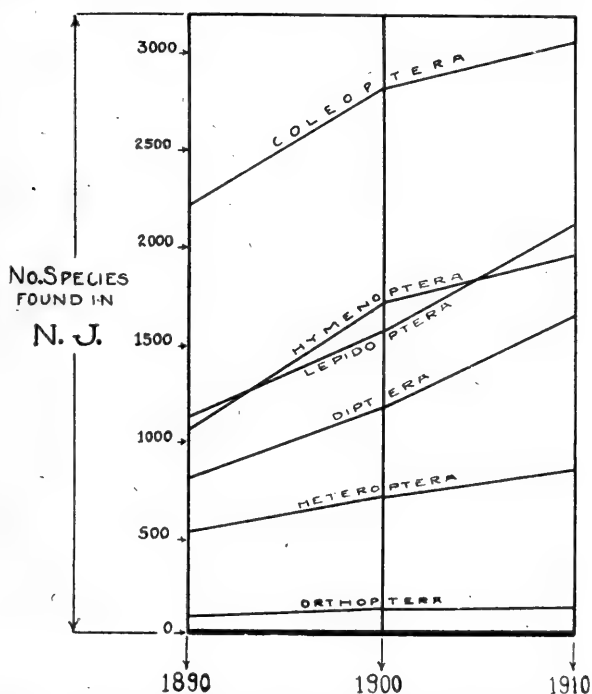


Fig. 33.—Additions to insects of New Jersey during 20 years (showing growth).

Figure 33 shows the growth, by means of comparative curves, in the knowledge of New Jersey's insects from 1890 to 1910 in ten year periods, this information having been obtained from Smith's *Insects of New Jersey*. The Coleoptera and Hymenoptera have run along somewhat parallel with respect to the number of additional species discovered during the twenty years from 1890 to 1910, and the largest part of this growth took place from 1890 to 1900. The Lepidoptera and Diptera show a steady upward trend, and the Heteroptera also, but at a slower rate. In charts

where the factor of time is considered, the earlier year should always appear at the left, and all vertical scales should read upward.

Figures 34 and 35 show map representations, which are common and convenient ways of charting certain kinds of information. Figure 34 illustrates the distribution by counties of two broods of



Fig. 34.



Fig. 35.

the Periodical Cicada in New Jersey. Distribution information should always be placed before a reader in a graphic way, as only in such a way can he grasp and visualize the material as a whole. Where necessary, the detailed printed information can accompany the chart, but it should never be used alone if one expects to convince the reader. Figure 35 shows the distribution of the nursery stock which entered New Jersey from other states during the fall of 1916. In order to bring the localities out more clearly, the dotted areas have been surrounded by heavy black lines. Both figures 34 and 35 are incomplete as to titles, which have been omitted purposely to show the ineffectiveness of such a procedure.

A good thing to remember in making graphic presentations and one which is often disregarded by entomologists, especially in their efforts to show the differences in yields between sprayed and unsprayed fruit trees by means of comparative drawings, is to have the presentation read from one dimension only and not to use areas and volumes which are so easily interpreted wrongly when quantities are represented. Inasmuch as many entomologists are familiar with curve plotting, no mention need be made of this method here, except to advocate its greater use. As stated before, this brief paper is merely suggestive, as are also the illustrations, which are not to be taken as examples, inasmuch as they are far from perfect. For a complete treatise on this subject, one is referred to "Graphic Methods for Presenting Facts" by Willard C. Brinton, published by the Engineering Magazine Company (New York City), a copy of which will be exceedingly useful to the entomologist who desires to present his material where possible in a convincing manner.

SOME PYRALID NOTES.

BY WM. BARNES, S. B., M. D. & J. MCDUNNOUGH, PH.D., DECATUR, ILL.

In a recent number of the *Insecutor* (Vol. V, pp. 69 *et seq.*) Dr. Dyar has given some valuable critical notes on the Pyraustids and other Pyralids as listed in our Check List; one of our purposes in publishing this list was to elicit just such new records from our North American fauna as Dr. Dyar gives; without published records species indigenous to the territory embraced in our list may long remain unlisted, known only to a few individual curators or workers, and we trust that others who have further new records may be prevailed upon to follow Dr. Dyar's example.

We are also pleased to adopt Dr. Dyar's references of several of our apparently new species to older names given to West Indian or Central and S. American material; based as they are on a study of the large collections from this territory in the National Museum they may be presumed to be correct; we had already expressed the hope (Contr. II, (6) p. 223) that workers more favourably situated than ourselves would endeavour to align our names with those from more southerly points, and Dr. Dyar's efforts in thus

straightening out the synonymy are, therefore, to be commended; such work is instructive, not destructive.

With a few of Dr. Dyar's references we cannot wholly agree and offer the following notes in this connection.

Genus *Egesta* Rag.

Dr. Dyar has apparently not referred to Ragonot's original separation of the genus *Egesta* from *Homophysa* Led. (*Glaphyria*, Hbn.) which was made in his "Classification des Pyralites p. 24" and seemingly overlooked by Hampson in his later Classification. Ragonot separates the species *renalis* (the spelling later corrected to *reniculalis*, l. c., p. 213) and *eripalis* from the other species of his *Homophysinae* on the strength of veins 10 and 11 being *separate* and not *stalked*; this character is entirely disregarded by Dr. Dyar who bases his separation of the genera *Egesta* and *Glaphyria* solely on the length of the maxillary palpi. *Smyphysa* Hamp. (type *sulphuralis* Cram.) calls for the same venation as does *Egesta*, and for this reason was listed by us as a synonym; this may be incorrect and will need verification by a study of the type species from Brasil. In any case the genus *Egesta* must be used for our North American species, and in order to avoid any further confusion regarding its status we would specify the type as *reniculalis* Zell.; further subdivision of the two genera may be necessary when the length of the maxillary palpi of the various species is taken into consideration, but according to the primary division on the strength of veins 10 and 11 being stalked or separate we believe our arrangement will hold. The North American species of the genera *Glaphyria*, *Egesta* and *Lipocosma* (as listed by us) form a group which must probably sooner or later be separated from the *Pyraustinae* entirely; careful study will doubtless bring further structural details to light and lead to a more satisfactory grouping of the species, but until this can be done and done thoroughly we prefer to adhere to the general grouping as indicated.

Sameodes adipaloides G. & R.

Dr. Dyar believes that this name should be given varietal rank and would apparently apply it, as has generally been done, to a smaller, suffused form found in the Northern Atlantic States.

The only type of the species which we have been able to find is in the American Museum Collection, a ♂ from Pennsylvania, and this type unfortunately does not bear out the above conception but, although in poor condition, is clearly a straight synonym of *elealis* Wlk. The original description of *adipaloides*, especially the statement that the ground colour is a "rather bright clear yellow" would seem to show that the author's conception of the species is correctly illustrated by this type; on the other hand the figure given of a ♀ specimen (Tr. Am. Ent. Soc. I, Pl. II, fig. 19) rather points (except in ground colour) in the other direction, but as this figure is not a photograph certain inaccuracies may possibly be laid to the door of the artist. Whether, therefore, the identification of *adipaloides* should be based on the existing type, which would appear authentic, or on the figure is a delicate point for specialists to wrangle over; if the view supported in our list be correct then a varietal name may be necessary for the *adipaloides* of various authors, but we prefer to leave the matter to Dr. Dyar's judgment rather than propose a new name with the prospect of being accused later of rushing into print and overburdening the synonymy.

***Diasemia (Metasia) elegantalis* Warr.**

Dr. McDunnough when last at the British Museum, carefully examined Warren's type and compared it with specimens he had brought with him; we have a note stating that the British Museum series was mixed, and that Warren's type was in poor condition but was evidently the same species as that described later by Fernald as *argalis*; this is also borne out by Warren's description which states that the reniform is large and filled with lilac-gray; the type localities for both species are California and we have not seen the species from any locality outside of this State. The other species considered by Dr. Dyar to be *elegantalis*, following an erroneous determination of Prof. Fernald's, occurs in Arizona and is apparently nameless. We venture to describe it as follows:

***Diasemia disputalis*, sp. nov.**

Very similar to *elegantalis* Warr. but the ground colour of

primaries paler, the orbicular and reniform filled with rather shiny whitish and the latter smaller and much more constricted centrally, being almost divided into two equal triangular spots; beyond the t. p. line is a faint silvery band in costal portion of wing and a broader bluish patch between the bend and inner margin; the fringes are smoky in basal half, whitish outwardly. The secondaries are paler than in *elegantalis* with only faint, smoky suffusion outwardly and an obsolescent postmedian line. Expanse 20 mm,

Habitat.—Palmerlee, Ariz.; Tuscon, Ariz. Three ♂'s, 3 ♀'s. Types, Coll. Barnes.

***Pyrausta orphisalis* Wlk.**

Our note regarding the type says that it is close to *generosa* G. & R., so that it may very well equal *ochosalis* Dyar as suggested by Dr. Dyar; in our list we kept the name separate for want of further verification, believing that a name wrongly sunk in the synonymy is more likely to be overlooked than a synonym wrongly standing as a species.

***Cornifrons pulveralis*, Warr.**

Our note, after studying the type of this species and that of *simalis* Grt. side by side, says that the former is more even gray on primaries, with a less oblique t. a. line and with the secondaries paler; we are not at all sure that Dr. Dyar is correct in regarding the two as simply forms of one species; his action without further evidence than a study of Warren's description might at least be characterized as premature.

***Macrotheca interalbicalis* Rag.**

Our identification of this species as figured by us in Contr. I, No. 5, Pl. III, fig. 9 has been confirmed by a comparison of specimens with Ragonot's type in Paris; it would seem, therefore, that *vulnifica* Dyar (1917, Ins. Menst. V, 83) will fall as a synonym. Ragonot's figures of both this species and *baccalis* are distinctly poor; it is very probable that *vicarilis* Dyar will become a synonym of this latter species; the reference is, however, not absolutely certain but should be kept in mind.

A NEW GENUS AND SPECIES OF COCCIDÆ.
(HEMIP.; HOMOP.).

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

Stomacoccus, new genus.

Coccidæ, referable to the tribe *Xylococcini* of the subfamily *Margarodina*, characterized, as are the other members of the subfamily, by the presence of legs in the first larval stage, the loss of these appendages in succeeding larval stages of the female, at least, and their reappearance in the adult female. Differing from any of the other members of the subfamily by the presence of mouth-parts in the adult female. Intermediate larval stages without an anal tube.

Type of the genus, *Stomacoccus platani*, n. sp.

Stomacoccus platani, n. sp.

Adult female 1.6 mm. long (on slide), of elongate form, with nearly parallel sides. In life of a deep yellow colour, without waxy secretion except for the fluffy ovisac in which the eggs are placed. *Antennæ* set close to the extreme anterior margin of the body with their bases nearly or quite touching, seven-segmented, the first segment large and stout, the second segment short and broad, the remaining segments becoming successively narrower and longer than the second with the seventh nearly as long as the first. *Legs* well developed, the anterior pair somewhat stouter than the others. Tarsal claw with at least six knobbed hairs arising near its base. *Body* apparently with no dorsal setæ, but with a pair of slender setæ at the base of each coxa and a median pair of such setæ on each ventral segment of the abdomen. *Pores* of wax-glands relatively few, concentrated toward the posterior end of the body, simple, surrounded by a chitinous ring. *Anal* opening on the dorsum of the last abdominal segment, very small, surrounded by a simple, chitinous ring. Eight pairs of spiracles present, two on the thorax and one on each of the first six abdominal segments.

Larva at first with legs and antennæ, the latter five-segmented, then losing these appendages and assuming a regularly oval form having much the appearance of some insect's egg. In life, of a

deep yellow or light brown colour, entirely devoid of secretion except for a few dorsal waxy filaments. Length of fully grown larva .5 mm. (on slide). Segmentation indistinct. Anal opening on dorsum at a slight distance from the posterior margin of the body, simple as in adult, without an anal tube. Tracheal system as in adult.

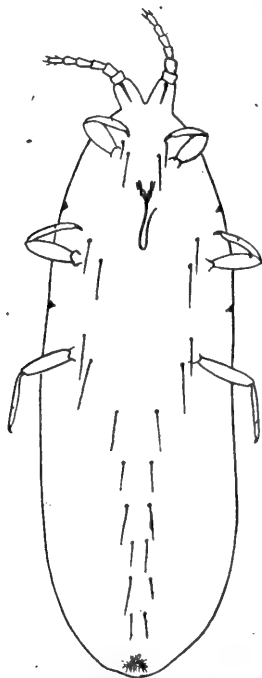


Fig. 36.—Adult female of *Stomacoccus platani*, n. sp.

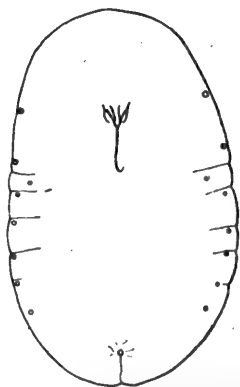


Fig. 37.—Larva of *Stomacoccus platani*, n. sp.

Adult male apterous, entirely devoid of waxy secretion, of a deep yellow colour. Antennæ 10-segmented. Eyes simple.

Male pupa enclosed within a loose sac.

Male prepupa with mouth-parts, legs and antennæ, the latter very short and stout, apparently eight-segmented. General form much like that of adult female. The earlier larval stages of the male have not been recognized and it is not known if there is an encysted stage, such as recorded by Hubbard and Pergande for the male larva of *Xylococcus betulæ* Hub. and Perg.

Types.—Holotype, an adult female, allotype and paratypes of adults and larvæ in the collection of the Department of Entomology of Stanford University. Paratypes in the collections of Mr. H. S. Smith and Mr. E. O. Essig. Type locality, Stevens Creek, Santa Clara County, Calif.

Host and distribution.—On leaves, branches and trunk of *Platanus racemosa* (sycamore), Pasadena, Calif., and Stevens Creek, Santa Clara Co., Calif.

This is the only species of *Margarodinae* as yet recorded in which the mouthparts are retained in the adult female, a fact that seems amply to justify the naming of a new genus. The adult female appears, aside from the possession of mouth-parts, to approach most closely the genus *Steingelia* Nasonow, a genus

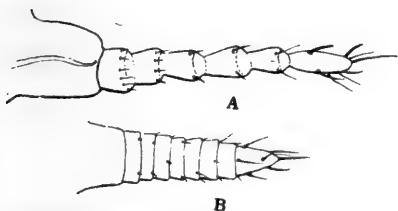


Fig. 38.—A.—Antenna of adult female of *Stomacoccus platani*, n. sp. B.—

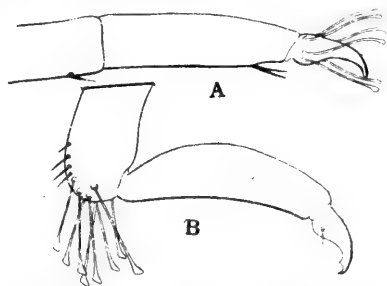


Fig. 39.—A.—Tarsus and portion of tibia of adult female of *Stomacoccus platani*, n. sp. B.—Tarsus and part of tibia of adult female of *Kuwania quercus* (Kuw.).

of two species, one of which, *S. gorodetskia* Nass., occurs in Russia (host not recorded) and the other *S. brittanica* (Green) on birch in England. The latter species was referred by its author to the genus *Kuwania* Ckll., but it is obviously not very closely related to the type species, *K. quercus* (Kuw.) as cotype specimens of the latter before me show, the most significant differences being in the structure of the legs. Whether it is a synonym of *S. gorodetskia* Nass., as suggested by Sasser in his Catalogue of Recently Described Coccidæ for 1915, can hardly be determined without knowledge of the larval forms which is lacking in the case of both these species.

Credit for the discovery of the species here described is due Dr. A. G. Smith, of Pasadena, who forwarded specimens to Mr.

H. S. Smith, of the State Commission of Horticulture of California. These specimens were forwarded to Mr. E. O. Essig and received from him by the author. Upon its appearing that the species was new Mr. Essig and Mr. H. S. Smith resigned their rights to it, and Mr. Smith procured an additional supply of material. To these gentlemen are due the fullest thanks for their kindness. A search by the author then revealed the species in the vicinity of Stanford University, a region that still continues to yield new forms and records in spite of years of assiduous collecting on the part of numerous workers.

The life history has been followed for but a short time, but this is sufficient to indicate its general course. The insect occurs either on the bark or on the leaves, probably passing the winter on the former and then going out to the leaves. The presence of adult males and females, mingled with all the immature stages, on leaves scarcely a month old indicates that the life cycle is quite short. The immature stages are attached solely by the beak and are entirely exposed either upon the under side of the leaves or upon the bark. The adult females seek the protection of bark scales when present but may form their ovisacs in the open, sometimes remaining even partially within the exuvium of the preceding stage although they are quite active. The males are very active and have been observed apparently attempting to copulate with females that were still in the appendageless state.

SOME SENSORY STRUCTURES IN THE APHIDIDÆ.

BY A. C. BAKER, WASHINGTON, D.C.

During the writer's studies on aphids he has had occasion to notice certain sensory structures on the wings and legs of these insects. These structures vary in the different groups, and since scarcely any references to them appear in the literature of the family the writer here records some of his observations. The pores on the legs are recorded in technical descriptions of species of *Chermes*, but those present on the legs of insects in other genera and on the wings appear not to be referred to in descriptions. Vickery* has mentioned the presence of pores on the legs. No experiments

*Rept. of State Ent. of Minn., 1907-08, p. 178.

have been conducted by the writer to indicate the nature of these organs, but they appear in structure quite similar to the sensoria of the antenna in the genus *Aphis*. They are small circular or oval structures composed of an outer rim and a middle pore-like centre. Each organ is often surrounded by an irregular or oval area which is differentiated from the surrounding chitin. The organs occur near the base of the wings on the thickened origin of the subcosta and radius, scattered along the area between these veins and on the trochanters and bases of the femora. None seems to be present on other portions of the legs. The species examined are arranged under their respective genera.

Genus *Lachnus*.

Besides the presence of many small pores near the base of the femur in species of this genus, larger ones, more or less tuberculate are sometimes also present in *ponderosa* Wms. (fig. 39) and *L.* sp. (fig. 40). *Curvipes* Patch (fig. 41) does not seem to possess any of these large pores. Another species (fig. 32) shows a broken group. Members of this genus also possess usually a group of small pores near the base of the hind wing as in *curvipes* (fig. 42) and *ponderosa* (fig. 43).

Genus *Essigella*.

Essigella californicus Essig. does not possess the group of small pores present in species of *Lachnus* examined, but the femora are provided with only two moderate sized ones near the base (fig. 44).

Genus *Symydobius*

S. oblongus Heyden seems to have none of these organs upon the wings. There are three or four however upon the femur, and about the same number upon the trochanter (fig. 20).

Genus *Myzocallis*

Members of this genus as well as other members of the tribe, have as a rule only a few pores situated at the base of the femur, for example, *M. alnifoliae* Fitch (fig. 47) and *M. bella* Walsh (fig. 48). They have no definite group on the wings but sometimes a few scattered pores on the subcosta.

Genus *Drepanaphis*.

D. acerifoliae Thos. possesses a few small pores upon the subcosta. On the femur there are usually two large pores which are

very distinct (fig. 31). They are more prominent upon forms taken in the summer than in the spring forms.

Genus *Pterocomma*.

All the species of this genus show the same character of these organs. There is a large group of very small pores close to the base of the femur. *Populifoliae* Fitch (fig. 33) and *smithiae* Mon. (fig. 34) show very compact groups. *Salicis* L. (fig. 35) shows numerous pores upon the trochanter and a group of nine or ten near the base of the fore wing (fig. 36). *Bicolor* Oest., (fig. 37) has a similar group upon the femur.

Genus *Trichosiphum*.

One species of this group has been examined, and it possesses one large pore near the base of the femur (fig. 46).

Genus *Aphis*.

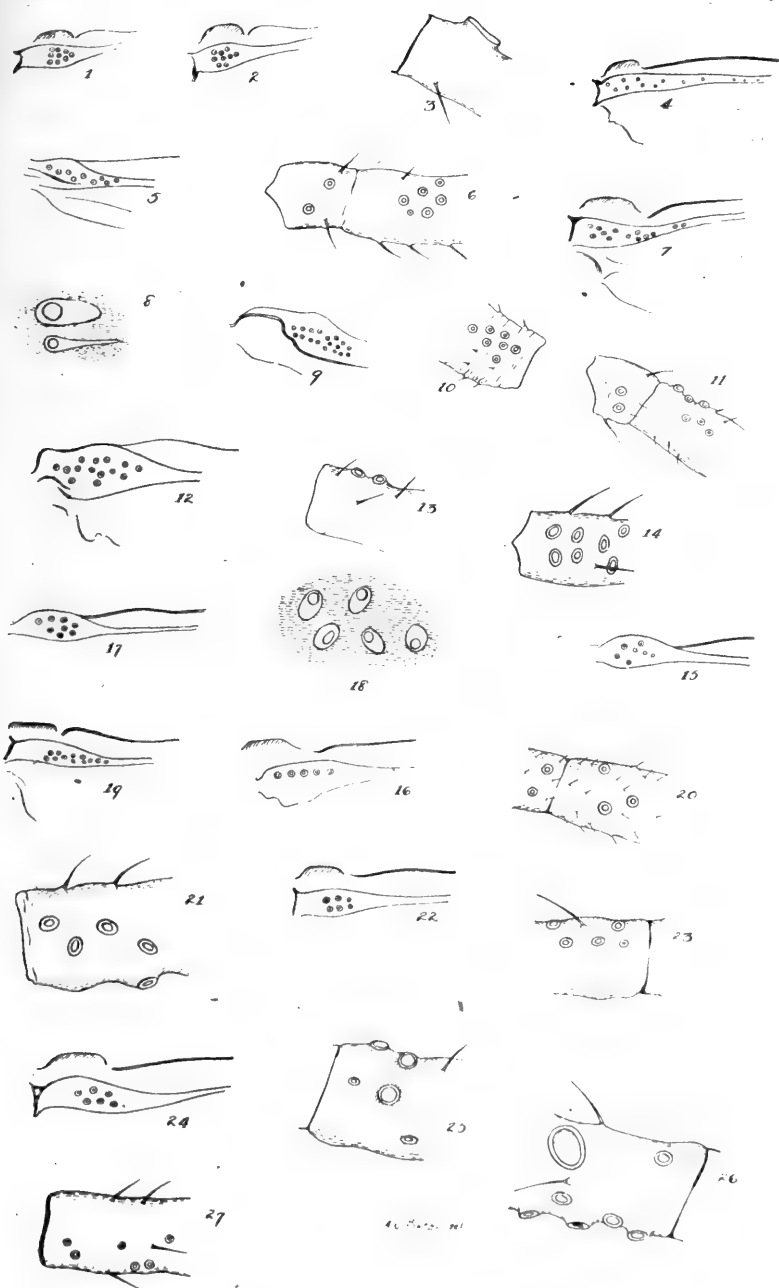
There is considerable variation met with in this genus. Most species have two or three of these organs at the base of the femur. *A. coreopsidis* Thos. (fig. 21) has a group of four or five at the base of the femur. *A. gossypii* Glover (fig. 32) is quite similar as is also *A. viburnicola* Gill (fig. 45). *A. madiradicis* Forbes shows a group near the base of the fore wing (fig. 22) and a group of four or five at the base of the femur. *A. middletoni* Thos., shows a group near the base of the fore wing (fig. 24), and about five near the base of the femur (fig. 25). It will be remembered that these last two species are subterranean. *A. maidis* Fitch, shows one of the deepest pores seen on any species (fig. 26). This huge pore is, however, not present on every specimen. The same thing is sometimes met with in species of *Lachnus*.

Genus *Myzus*.

Myzus cerasi Fab. shows one or two pores at the base of the femur, and *M. plantaginis* Fab., has a group of about four near the base of the hind wing (fig. 28).

Genus *Macrosiphum*.

M. circumflexum Buckton, possesses a scattered group of about six small pores on the femur (fig. 27). None is found upon the wings, or if so a few small ones along the subcosta. *M. ambrosiae* Thos., has one pore at the base of femur and a few minute ones along the subcosta of the wing.



SENSORY STRUCTURES IN APHIDS (p. 378).

Genus *Toxoptera*.

T. graminum Rond. possesses three or four large pores at the base of the femur quite similar to those met with in the genus *Aphis*.

Genus *Rhopalosiphum*.

R. rhois Mon. possesses about six pores at the base of the femur but these are considerably scattered (fig. 29). Another species examined possesses four near the base (fig. 30).

Genus *Anoecia*.

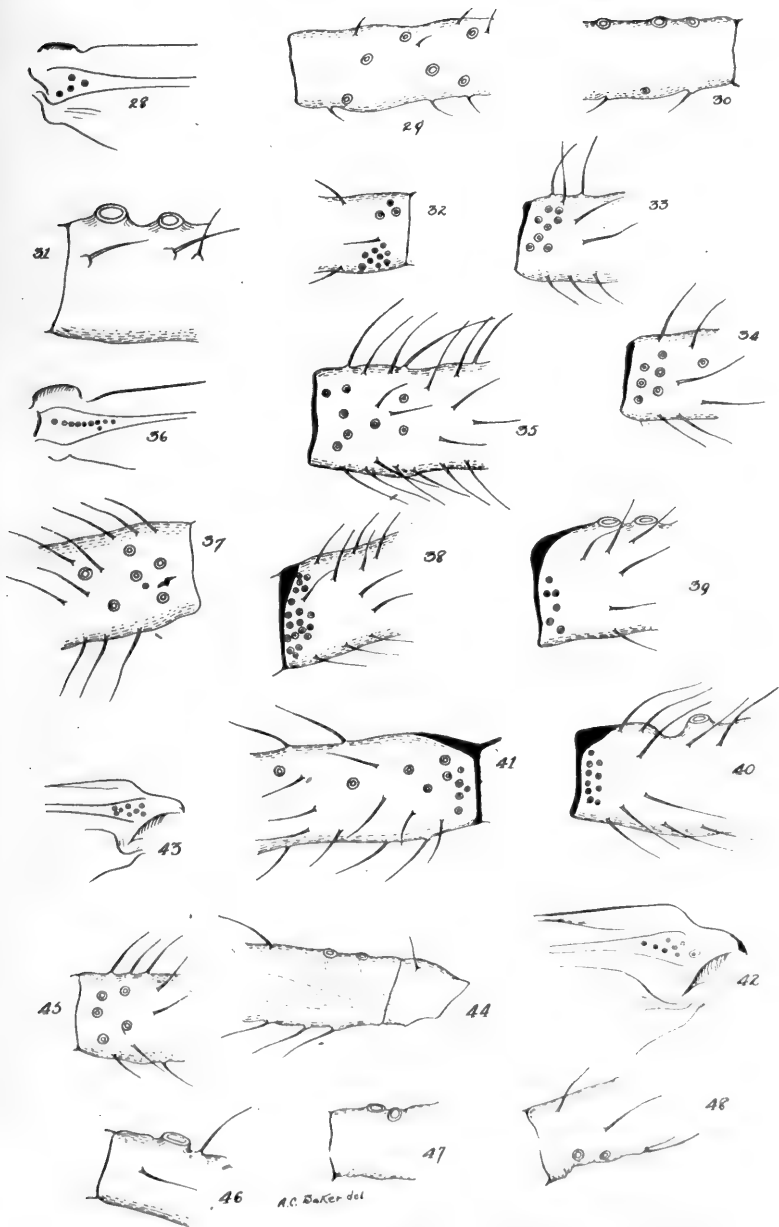
Two species of this genus *querci* Fitch., and *corni* Fab. were examined. Fall migrants were used in both cases. Both showed about the same group of six to ten near the base of the fore wing, but the organs of the femur are different. *Querci* Fitch shows a row of four or five extending about one-quarter of the way along the segment, whereas *corni* gave a group of six or seven near the the base (Fig. 14).

Genus *Eriosoma*.

E. americanum Riley shows a group of three to nine pores at the base of the fore wing (Fig. 17). These are surrounded by irregularly shaped areas (Fig. 18). There are about three present, usually at the base of the femur and usually three at the base of the hind wing. *E. pyricola* B. & D., has a group somewhat larger near the base of the fore wing (Fig. 19), and some four or five also along the subcosta.

Genus *Prociphilus*.

Several species of this genus were studied and they proved to be all quite similar as far as these organs are concerned. *P. bumulae* Sch., possesses a group of about 18 pores at the base of the hind wing (Fig. 9) and a few scattered along the subcosta of the fore wing. The base of the femur has another group of about eight pores (Fig. 10). *P. pyri* Fitch is very similar to *bumulae* as far as the wings are concerned, there being a group of about 15 at the base of the hind wing. The group on the femur is a little more scattered in *pyri* (Fig. 11) and several are seen on the trochanter. *P. imbricator* Fitch has a group of about fifteen at the base of the hind wing (Fig. 12), and a scattered group of about six on the proximal end of the femur. There are also two or three near the base of the fore wing.



SENSORY STRUCTURES IN APHIDS (p. 378).

Genus *Thecabius*.

Thecabius affinis shows a large group arranged in more or less of a row near the base of the fore wing. Two or three only are present near the base of the femur (Fig. 13).

Genus *Pemphigus*.

Several species of this genus were studied and they all showed a considerable number of pores. *P. populicaulis* Fitch has a series of nine or ten at the base of the hind wing (Fig. 5), and about three on the fore wing. The base of the femur in this species is armed with a group of five or six and two or three are present on the trochanter (Fig. 6). Another species of this genus taken in Colorado shows a similar group, but about a dozen are present on the fore wing (Fig. 7). These are surrounded by oval or elongate transparent areas (Fig. 8). The individuals of this second species were taken underground.

Genus *Colopha*.

C. ulmicola Fitch possesses a group of five or six in an even row near the base of the fore wing (Fig. 16).

Genus *Hormaphis*.

H. hamamelidis Fitch, possesses a series of about a dozen small pores. Scattered near the base of the wing none was observed on the legs.

Genus *Phylloxera*.

Two species of this genus were examined, *caryæcaulis* Fitch and *castaneæ* Hald. Both showed the same character of the grouping of the pores. These occurred near the base of the fore wing in a rather compact group, *caryæcaulis* (Fig. 1) and *castaneæ* (Fig. 2). The legs seem to show no small pores, but some specimens of *castaneæ* possess one large pore (Fig. 3).

It will be seen from the foregoing tabulation that species living underground and those inhabiting galls possess upon their wings more of these structures than the free-living solitary forms. In fact many of the latter have none upon the wings at all. This applies also to those present upon the legs. Species living underground possess them, as a rule, in more abundance than their near relatives which are not subterranean. This will be noted in the genus *Aphis*. In some genera, however, such as the genus *Lachnus*, the aerial forms have these structures in quite large numbers on the legs.

NEW COLEOPTERA. VII.

BY H. C. FALL, PASADENA, CAL.

In view of the possible appearance in the not distant future of a synopsis of the North American species of *Conotrachelus*, it is thought best to present at this time descriptions of two new species, which have been drawn up for some time. With these are submitted descriptions of what appear, with present light, to be five new species of *Ceutorhynchus*. It is rather remarkable that four of the five were taken at the same place—Aweme, Manitoba—and all in the same month, by Mr. Norman Criddle, who has sent them to me for determination. Types of all the above are in my collection.

CONOTRACHELUS SCH.

***Conotrachelus biscaynensis*, n. sp.**

Form approaching that of *anaglypticus*, but with the prothorax somewhat wider and the elytra a little less robust. Colour piceous, the beak and tibiæ dark rufous; vestiture consisting of rather narrow to linear appressed scales, mostly brownish fulvous in colour and irregularly dispersed, with a few, usually broader, creamy white scales aggregated in very small spots, mostly along the elytral costæ. Head coarsely punctate, with a small, inconspicuous frontal fovea; beak about two-fifths the length of the body, polished and very sparsely, finely punctate apically, lightly sulcate at sides posteriorly; antennæ inserted at apical third. Prothorax a little wider than long, sides parallel and straight in about basal half, thence a little oblique nearly to the apical constriction; surface coarsely, densely cribrate punctate, median line imperfectly and incompletely carinate. Elytra one-half wider at base than the thorax, sides feebly sinuate for a short distance at base, becoming widest at about basal third, thence arcuately narrowing to apex; striae punctures rather coarse, intervals 3, 5, 7, 9 acutely carinate throughout. Mesosternum not protuberant; metasternum grossly punctate; first ventral similarly, coarsely but still more sparsely so, following segments broadly smooth and polished at middle, punctate only at sides, last segment unmodified. Femora obscurely annulate and unidentate.

Length 4.1 mm.; width 2.2 mm.

November, 1917

Biscayne, Florida, May 14. (Hubbard and Schwarz). A single specimen, probably a female, is before me. By LeConte's table it would fall near *germinatus*, but it does not at all resemble the latter. In general aspect it is very similar to *floridanus*, but is less elongate and with very differently punctured ventral segments.

***Conotrachelus obesus*, n. sp.**

Form of *anaglypticus* but with a relatively wider thorax; piceous, vestiture not well preserved, consisting, so far as visible, of very small, short, appressed dirty white scales or squamiform hairs on the elytra, and short squamiform setæ within the coarse punctures of the prothorax. Head densely punctate, more coarsely so in front at the base of the beak, the latter stout, not longer than the prothorax, carinate and sulcate as in *anaglypticus*. Prothorax slightly broader than long, sides parallel and nearly straight in basal two-thirds, surface very coarsely, densely cribrate punctate, median line not carinate, but with a short, narrow, smooth line behind the middle, and two short, parallel raised lines or crests in front. Elytra five-eighths wider than the prothorax, three-tenths longer than wide, with striae of coarse punctures; intervals 3, 5, 7, 9 acutely carinate, the carinae of the third and fifth abruptly interrupted before the middle, but not at all so posteriorly. Mesosternum moderately coarsely punctate, protuberant in front. Ventral segments opaque, rather coarsely but not very densely punctate. Legs stout, annulate; femora with a stout, triangular tooth and a small denticle.

Length 5 mm.; width 2.8 mm.

Georgia.—A single example of unknown sex. It is impossible to say from the type whether the elytra when in perfect condition, are as completely clothed as in *anaglypticus*, but it seems probable that this is the case, as the two species are closely allied in most respects. The present species is larger than *anaglypticus*, which differs notably by its non-interrupted elytral costæ.

CEUTORHYNCHUS GERM.

***Ceutorhynchus echinatus*, n. sp.**

Moderately broadly oval, convex, piceous, sides of elytra gradually brunnescent, legs dull rufous, elytra conspicuously

tuberculate and hispid. Antennæ brownish piceous, scape and basal joint of funicle pale, base of club also paler and subglabrous; funicle 6-jointed, second joint a little shorter than the first, fully twice as long as wide; third joint three-fourths as long as the second; fourth, fifth and sixth subequal, each a little shorter than the third and slightly longer than wide; club as long as the preceding four joints, ovate-pointed. Head coarsely, densely cribrate punctate, a short occipital carina; beak rather stout, as long as the prothorax, striate basally and densely, coarsely punctate and hispid throughout; antennæ inserted slightly beyond the middle. Prothorax about one-fifth wider than long, sides parallel in basal third, broadly constricted in front, apex a little more than one-half as wide as base, apical margin scarcely sinuate at middle, median sulcus narrow, moderately deep posteriorly, evanescent in front, lateral tubercles small but acute, vestiture of intermingled fine white and blackish setæ, the former less erect, the latter bristling but more or less recurved, and with small patches of elongate, appressed white scales at the hind angles at base of median sulcus. Elytra about as wide as long, sides feebly rounded and subparallel basally; striæ moderate, intervals each with a single series of strongly elevated, shining tubercles, which are acute when viewed laterally, but with transversely arcuate outline when viewed from behind, each bearing at its summit a long, blackish, erect but recurved seta. The surface is also clothed sparsely throughout with shorter, more inclined white hairs; a short linear patch of white scales at the base of the suture. Body beneath coarsely, densely punctured, the sternal side pieces albo-squamose, the ventral segments with intermixed, whitish scales and erect, dark hairs, the former predominating at the sides. Legs moderate, the femora armed with a very small acute tooth; ungual teeth approximate, and very nearly as long as the claws.

Length 2.5 mm.; width 1.5 mm.

Aweme, Manitoba, Sept. 25, on *Heuchera hispida* (Criddle). The type is a male, having all the tibiae strongly unguiculate, and the last ventral with a rather shallow median fovea, with its lateral margins somewhat elevated posteriorly.

This remarkable little species does not in all respects look like a *Ceutorhynchus*, but I am unable to refer it elsewhere. It may be placed near *sulcipennis* and *decipiens* for the present.

Ceutorhynchus invisus, n. sp.

Oval, convex, black, thinly clothed above with appressed, hair-like scales, grayish to pale brownish in colour, rather inconspicuously condensed in a narrow, basal, sutural spot, and at the base of the pronotal sulcus, and arranged on the elytral interspaces in two or three somewhat irregular series; the scales of the elytral striae are just visibly coarser and more uniformly whitish. Antennae entirely piceous, funicle 7-jointed, funicular joints gradually shorter, the second scarcely twice as long as wide, inserted at the middle of the beak (♂). Beak very little longer than the prothorax, striate and punctate basally, more sparsely punctured and shining apically. Prothorax one-fifth wider than long, moderately narrowed and constricted anteriorly, front margin entire, median line sulcate, lateral tubercles small, obtuse, surface shining and densely, coarsely punctate. Elytra across the humeri four-ninths wider than the prothorax, scarcely one-fourth longer than wide, gradually narrowed from the humeri, intervals rugose, nearly flat, twice as wide as the striae, declivity with some acute granules. Body beneath more closely clothed with broader grayish white scales. Legs moderate, femora toothed, claws with an acute basal tooth rather approximate to its fellow.

Length 2.35 mm.; width 1.4 mm.

Aweme, Manitoba, Sept. 23. (Criddle).

The type is a male, having the last ventral distinctly foveate, the sides of the fovea not elevated, the four posterior tibiae distinctly unguiculate.

Using Dietz' table of groups, one is uncertain whether to refer this species to the *subpubescens* or *sulcipennis* group, since the vestiture is neither dense, nor very sparse. Blatchley and Leng unite these two groups in their own Group "A," and by their table the present species would seem to fall between *marginatus* and *sulcipennis*, differing from the former by its smaller size and shorter basal tooth of claws, and from the latter, among other characters, by the less deeply sulcate elytra with much less rugose intervals.

Ceutorhynchus omissus, n. sp.

Oval, black, opaque, clothed not densely above with short,

whitish, piliform scales, which become broader and more numerous in the median thoracic sulcus and along the base of the thorax, also obscurely so at the base of the elytral suture. Antennæ piceous, second funicular joint elongate, the third about two-thirds as long as the second. Beak slender, arcuate, serially punctate at sides basally, finely punctulate and shining above and apically, the punctures showing a tendency to unite longitudinally. Antennæ (♀) inserted slightly behind the middle. Head closely punctate. Thorax moderately transverse, gradually narrowed from the base, broadly constricted apically, anterior margin feebly subsinuate at middle, punctuation dense, moderately coarse, median line distinctly impressed, lateral tubercles small. Elytra about one-fourth longer than wide, widest across the humeri, gradually narrowed posteriorly, rather finely striate, intervals twice as wide as the striae, rugose, each with a double line of appressed piliform scales; declivity with some acute granules. Body beneath closely, coarsely punctate, each puncture bearing a more or less elongate white scale; last ventral with a rather shallow, median fovea. Legs rather slender, femora unarmed, last tarsal joint projecting a distance subequal in length to the lobes of the preceding joint, claws with an acute basal tooth subapproximate to its fellow.

Length 2.4 mm.; width 1.3 mm.

Aweme, Manitoba, Sept. 23, (Criddle).

This species belongs to the *convexicollis* group, and may precede *mutabilis*, from which and *ovalis* it differs in its narrow, piliform vestiture.

***Ceutorhynchus moznettei*, n. sp.**

Oblong oval, moderately convex, piceous, vestiture above consisting of small, not densely placed, brownish piliform appressed scales, with broader white scales condensed in a baso-sutural spot, and in the pronotal sulcus; a few similar scales along the basal margin of the elytra, about the elytral apex and scattered singly very remotely over the elytral disk; body beneath rather densely grayish squamose. Antennæ piceous, inserted just perceptibly beyond the middle of the beak; funicle 7-jointed, second joint slender, but little shorter than the first, fully three times as long

as wide, and subequal to the next two. Head densely punctate, front concave, vertex finely carinate. Beak moderate, striate and punctate as usual. Prothorax moderately transverse, sides arcuately subparallel basally, surface densely punctate, median channel distinct, deeper behind, lateral tubercles obtuse. Elytra distinctly longer than wide, broadly arcuately narrowed posteriorly; striae fine; intervals broad, flat, each with three or four more or less irregular series of small, hair-like scales. Legs moderate, thighs unarmed, feebly annulate with whitish scales. Claws with a rather small but acute basal tooth.

Length 2.9 mm.; width 1.75 mm.

Corvallis, Oregon, (Moznette).

The type is a male, having the last ventral distinctly foveate, and the middle and hind femora unguiculate.

This species must be placed near *mutabilis* Dietz. The latter is a smaller species, with coarser, less appressed vestiture, the broader scales of the upper surface much more numerous.

***Ceutorhynchus convexipennis*, n. sp. ♀**

Oval, black, moderately shining, thinly clothed above with short, white appressed hairs which are somewhat coarser on the elytra, where they are disposed in nearly single series on the intervals, as well as in the striae. Antennae entirely piceous, funicle 7-jointed, first and second joints subequal in length, following joints gradually shorter. Beak rather slender, evenly arcuate, shining, sparsely punctate and lightly striate at sides basally; more sparsely, finely and irregularly punctate above and apically; antennae inserted at about the middle (♀?). Head densely, evenly punctate. Prothorax coarsely, densely punctate, the punctures round and nearly in mutual contact; base much wider than the apex, sides parallel in nearly basal half, broadly constricted apically, anterior margin not emarginate, lateral tubercles small, acute. Elytra sub-oval, strongly convex, two-sevenths wider than the prothorax and a little more than one-fourth longer than wide, widest at basal fourth; striae moderate, intervals a little wider than the striae, only slightly convex, surface feebly rugose, some small, acute granules on the declivity. Body beneath coarsely, closely punctate, each puncture bearing a white scale, the scales a little

broader and more approximate on the sternal side pieces. Legs rather slender, femora not toothed, terminal joint of tarsi projecting a distance rather less than the length of the lobes of the preceding joint; claws simple.

Length 1.8 mm.; width .9 mm.

Aweme, Manitoba, Sept. 8, (Criddle).

A small species belonging to the *squamulatus* group of Dietz, in which it may best follow *persimilis*, though not agreeing closely with any species of the group. The small size and lack of true scales on the upper surface distinguishes it from all but *albopilosulus*, which differs in its erect, coarser vestiture among other characters.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

(Continued from page 336.)

Coccophagus brunneus. Type.—Yellow label 1384. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Coccophagus compressicornis. Type.—Harrington Coll.

Coccophagus pallipes. Type.—Yellow label 1389; blue 783(s). 2nd Coll. Pub. Mus., Quebec. Head gone.

Coleocentrus mellipes. Type.—Not located.

Coleocentrus quebecensis. Type.—Not in Pub. Mus., Quebec., unless under *C. pettiti* Cress.

Coleocentrus rufus. Type.—Female, yellow label 456. 1st Coll. Pub. Mus., Quebec.

Copelus paradoxus.—See *Helorus*.

Copidosoma pallipes. Type.—Harrington Coll.

Crabro aciculatus. Type.—Female, yellow label 813. 2nd Coll. Pub. Mus., Quebec. Male, allotype, without label.

Crabro niger. Type.—Female, blue-green label 852(s), yellow label 1660. 2nd Coll. Pub. Mus., Quebec.

Crabro 4-maculatus. See *C. 4-punctatus*. Type the same specimen.

Crabro 4-punctatus. Type.—Female, yellow label 807. 2nd Coll. Pub. Mus., Quebec. See *C. 4-maculata*. See Fauna p. 654 and table 653, both names used.

Cratospila aciculata. Type.—No specimen. Pin with name label. 2nd Coll. Pub. Mus., Quebec. Probably returned to collector.

Cratospila brevicauda. Type.—Female, yellow label 1273. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left flagellum.

Cratospila caudata. Type.—Female, yellow label 606. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Cremastus fusiformis. Type.—Female, yellow label 306. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at apex.

Cremastus longicaudus. Type.—Female, yellow label 1050. 2nd Coll. Pub. Mus., Quebec.

Cremastus mellipes. Type.—Female, yellow label 363. 1st Coll. Pub. Mus., Quebec. Antennæ broken near middle; fore wings gone; badly pinned. Female. 2nd Coll. antennæ broken.

Cremastus rectus. Type.—Yellow label 361. 1st Coll. Pub. Mus., Quebec. Left antenna at scape, left hind leg at coxa and abdomen gone.

Cremastus royi. Type.—Female, yellow label 674. 2nd Coll. Pub. Mus., Quebec.

Cryptus affabilis. Type.—Female, yellow label 258. 2nd Coll. Pub. Mus., Quebec.

Cryptus albonotatus. Type.—Not located.

Cryptus amblytelarius. Type.—Female, yellow label 1204. 2nd Coll. Pub. Mus., Quebec.

Cryptus annulatus. Type.—Female, yellow label 291. 1st Coll. Pub. Mus., Quebec. Lacks right fore wing.

Cryptus apicatus. Type.—Female, yellow label 246. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna.

Cryptus belangeri. Type.—Not in Pub. Mus., Quebec, unless under name *C. nuncius* Say. One specimen.

Cryptus brevicornis. Nat. Can., Vol. 7, p. 176.—See *Phygadeuon impressus*.

Cryptus brevicornis. Of index p. 432. Type.—Female, old rose label 79; yellow label 1202. 2nd Coll. Pub. Mus., Quebec.

Cryptus canadensis. Type.—Male, yellow label 248. 2nd Coll. Pub. Mus., Quebec. Lacks left antenna.

Cryptus certus. Type.—Not in Pub. Mus., Quebec, unless under name *C. fungor* Nort. Two damaged specimens.

Cryptus cinctus. Type.—Male, yellow label 292. 1st Coll. Pub. Mus., Quebec. Lacks apex of right antenna.

Cryptus circumcinctus. Type.—Male, yellow label 516. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Cryptus collaris. Type.—Male, blue label 121, yellow label 1206. 2nd Coll. Pub. Mus., Quebec.

Cryptus dubius. Type.—Not in Pub. Mus., Quebec. Probably returned to collector. (Geddes).

Cryptus eburneifrons. Type.—Male, yellow label 517. 2nd Coll. Pub. Mus., Quebec. Lacks most of antennæ.

Cryptus elongatus. Type.—Male, yellow label 670. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ and hind legs.

Cryptus erythropygus. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus exilis. Type.—Male, yellow label 283. 1st Coll. Pub. Mus., Quebec.

Cryptus flavipectus. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon scitulus* Cress.

Cryptus fletcheri. Type.—Female, white label 115; also "*Cryptus* ♀ *fletcheri* Prov. Type.—Victoria, V. I." in hand other than Provancher's. 2nd Coll. Pub. Mus., Quebec.

Cryptus gracilis. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus ignotus. Type.—Male, Harrington Coll. Pink label "P 423." Part of left antenna gone.

Cryptus imitator. Type.—Female, yellow label 296. 1st Coll. Pub. Mus., Quebec.

Cryptus incognitus. Type.—Blue label 39; yellow label 1205. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Cryptus insignis. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon blakei* Cress.

Cryptus latus. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon occidentalis*.

Cryptus linearis. Type.—Male, old rose label 49. Yellow label 1207. 2nd Coll. Pub. Mus., Quebec. Part of antennæ gone.

Cryptus longicaudus. Type.—Female, Harrington Coll. Pink label "P. 375."

Cryptus mellicoxus. Type.—Male, yellow label 1209. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone; abdomen glued on number label.

Cryptus mellipes. Type.—Female, Harrington Coll. Pink label "P. 392." Abdomen wanting, wings except left hind wanting.

Cryptus montivagus. Type.—Female, yellow label 251. 2nd Coll. Pub. Mus., Quebec. Lacks most of flagella.

Cryptus mundus. Type.—Male, yellow label 245. 2nd Coll. Pub. Mus., Quebec. Lacks part of antennæ and right hind leg.

Cryptus nigricornis. Type.—Male, yellow label 294. 1st Coll. Pub. Mus., Quebec. Lacks left antenna beyond 4th joint.

Cryptus nigricoxus. Type.—Male, yellow label 1553. 2nd Coll. Pub. Mus., Quebec.

Cryptus notatus. Type.—Male, yellow label 254. 2nd Coll. Pub. Mus., Quebec.

Cryptus occidentalis.—See *Phygadeuon occidentalis*.

Cryptus ornatus. Type.—Not in Pub. Mus., Quebec.

Cryptus osculatus. Type.—Male, yellow label 281. 1st Coll. Pub. Mus., Quebec. Lacks right flagellum.

Cryptus pentagonalis. Type.—Harrington Coll. Male, pink label 425. Female, pink label 431.

Cryptus perditus. Type.—Male, Harrington Coll. Pink label "P. 442." Lacks antennæ and right fore wing; other wing folded and hard to see.

Cryptus pubescens. Type.—Male, Harrington Coll. Pink label "P. 424."

Cryptus quebecensis. Type.—Not in Coll. unless under name *Ichneumon velox* Cress. Two females. 1st Coll. fair.

Cryptus rectus. Type.—Male, yellow label 1208. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Cryptus ruficornis. Type.—Male, yellow label 519. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Cryptus rufoannulatus. Type.—Female, yellow label 286. 1st Coll. Pub. Mus., Quebec.

Cryptus rufus. Type.—Male, yellow label 259. 2nd Coll. Pub. Mus., Quebec. Lacks right flagellum.

Cryptus scutellatus. Type.—Male, yellow label 282. 1st Coll. Pub. Mus., Quebec. Lacks apices of antennae some tarsi, and abdomen has been glued on.

Cryptus segregatus. Type.—Male, Harrington Coll. Pink label "P. 422."

Cryptus sericeifrons. Type.—Female, yellow label 515. 2nd Coll. Pub. Mus., Quebec. Most of flagellum gone. No male in Coll.

Cryptus signatus.—See *Phygadeuon signatus*.

Cryptus sordidus. Type.—Female, Harrington Coll. Pink label "P. 373." Abdomen off but glued on card.

Cryptus soriculatus. Type.—Male, yellow label 697. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna.

Cryptus spissicornis. (Addit. 1886, p. 68, not suppl. p. 361). Type.—Not in Pub. Mus., Quebec, unless under *Cryptus crassicornis* of which there is one specimen agreeing with description of *spissicornis*.

Cryptus spissicornis. (1888, suppl. p. 361 not Addit., 1886, p. 68). Type.—Female, yellow label 1582. 2nd Coll. Pub. Mus., Quebec.

Cryptus 3-annulatus. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus varius. Type.—Not in Pub. Mus., Quebec, unless under name *Cryptus atricollaris* Walsh.

Cteniscus apicatus. Type. Male, yellow label 341. 2nd Coll. Pub. Mus., Quebec. Lacks antennae.

Cteniscus concolor. Type. Female, yellow label 321. 2nd Coll. Pub. Mus., Quebec. Under name *Mesoleptus concolor* Cress. Lacks most of antennae.

Cteniscus crassipes. Type. Not in Pub. Mus., Quebec. Probably returned to collector.

Cteniscus rufus. Type.—Public Mus., Quebec. Data from pin not obtained.

Ctenopelma sanguinea. Type.—Pub. Mus., Quebec. Data from pin not obtained.

Cylloceria lemoinei. Type.—Male, yellow label 470. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ.

Cyrtocentrus quebecensis. Type.—Female, yellow label 693. 2nd Coll. Pub. Mus., Quebec. Antennæ wanting beyond third joint.

Dacnusa crassitela. Type.—Female, yellow label 1299. 2nd Coll. Pub. Mus., Quebec. Antennæ broken, right at scape, left at seventh joint.

Dacnusa spatulata. Type.—Female, yellow label 1305, blue label 669. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tips.

Decatoma basilaris. Type.—Not in Pub. Mus., Quebec, unless under *Isosoma hordei*.

Diastrophus piceus. Type.—White label 3(s); yellow label 1325. 2nd Coll. Pub. Mus., Quebec.

Diastrophus 5-costatus. Type.—Not located.

Dimicrostrophis nigricornis. Type.—Mica point, blue label 759(s); yellow label 1664. 2nd Coll. Pub. Mus., Quebec.

Dineura americana. Type.—Yellow label 639. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Dinocamptus linearis. Type.—Yellow label 1275. 2nd Coll. Pub. Mus., Quebec. Thorax broken by pin and abdomen crushed out of shape at apex. Sex of type uncertain but believed to be female.

Dinotus acutus. Type.—Yellow label 1385. 2nd Coll. Pub. Mus., Quebec. Badly glued; another specimen in better condition.

Dolichoderus borealis. Type.—Yellow label 1603. 2nd Coll. Pub. Mus., Quebec.

Doryctes atripes. Type.—Female, yellow label 1262. 2nd Coll. Pub. Mus., Quebec.

Doryctes bæticatus. Type.—Yellow label 557. 2nd Coll. Pub. Mus., Quebec. Abdomen wanting.

Doryctes cingulatus. Type.—Female, yellow label 556. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Doryctes fartus. Type.—Female, yellow label 558. 2nd Coll. Pub. Mus., Quebec.

Doryctes macilentus. Type.—Female, yellow label 559. 2nd Coll. Pub. Mus., Quebec. No male in collection.

Doryctes pallipes. Type.—Female, yellow label 1569. 2nd Coll. Pub. Mus., Quebec.

Echthrus canadensis. Type.—Female, yellow label 468. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Echthrus luctuosus. Female, yellow label 521. 1st Coll. Pub. Mus., Quebec. Lacks apex of left antenna and abdomen.

Echthrus nigricornis. Type.—Male, yellow label 421. 2nd Coll. Pub. Mus., Quebec. Fair.

Echthrus pediculatus. Type.—Female, yellow label 937. 2nd Coll. Pub. Mus., Quebec.

Echthrus provancheri. Type.—Female, yellow label 1143; printed name label. 2nd Coll. Pub. Mus., Quebec. Considered as Brodie's species. The description was first published by Provancher and there is no indication that it was quoted from Brodie. Provancher indicates that it is his description so the species should, unfortunately, be accredited to Provancher.

Echthrus rubripes. Type.—Female, yellow label 1064. 2nd Coll. Pub. Mus., Quebec. Left wings gone.

Eclytus pleuralis. Type.—Female, yellow label 410. 1st Coll. Pub. Mus., Quebec.

Eclytus robustus. Type.—Female, yellow label 996. 2nd Coll. Pub. Mus., Quebec. Abdomen and part of antennæ gone.

Elis dives. Type.—Female, Cat. No. 1971, U. S. Nat. Mus.

Elis 4-cinctus. Type.—Male, Cat. No. 1972, U. S. Nat. Mus.

Emphytus hullensis. Type.—Harrington Coll.

Emphytus nigristigma. Type.—Yellow label 1543; name label "*Nematus nigristigma*." 2nd Coll. Pub. Mus., Quebec. Provancher's catalogue proves this.

Emphytus pallipes. Type.—Female, yellow label 35. 1st Coll. Pub. Mus., Quebec. Specimen without label, paratype.

Ephedrus completus. Type.—See introduction (Aphidiinae).

Ephedrus incompletus. Type.—See introduction (Aphidiinae).

Ephialtes variatipes. Type.—Harrington Coll. teste Davis. Not in Pub. Mus., Quebec.

Epirhyssa clavata. Type.—Female, yellow label 1260. 2nd Coll. Pub. Mus., Quebec. Lacks abdomen and apices of antennae.

Epirhyssa crevieri. Type.—Male, yellow label 388. 2nd Coll. Pub. Mus., Quebec.

Epyris formicoides. Type.—White label "Hull 25-8-84 Rus"; blue label 312; yellow label 1028. 2nd Coll. Pub. Mus., Quebec.

Epyris prolongatus. Type.—Yellow label 744(s). 2nd Coll. Pub. Mus., Quebec. Abdomen gone.

Eriocampa marginata.—See Selandria.

Eriocampa superba. Type.—Female, yellow label 1544. 2nd Coll. Pub. Mus., Quebec.

Erronemus bedardi. Type.—Female, yellow label 658. 2nd Coll. Pub. Mus., Quebec.

Erronemus marginatus. Type.—Female, yellow label 989. 2nd Coll. Pub. Mus., Quebec.

Erronemus tristis. Type.—Female, blue label 594. 2nd Coll. Pub. Mus., Quebec. Left antenna gone.

Eubadizon basilare. Type.—Not located.

Eubadizon californicus. Type.—Female, yellow label 1489. 2nd Coll. Pub. Mus., Quebec. Antennae broken beyond middle, head broken off and mounted on tag.

Eubadizon gracilis. Type.—Female, yellow label 603. 2nd Coll. Pub. Mus., Quebec. One antenna and left hind tarsi broken.

Eucerceris insignis. Type.—Male, white label 77(s); yellow label 1626. 2nd Coll. Pub. Mus., Quebec.

Eucharis gibbosa. Type.—Yellow label 623. 2nd Coll. Pub. Mus., Quebec. Head gone.

Eucoila minor. Type.—Not located.

Eulophus ramosus. Type.—Yellow label 924. 2nd Coll. Pub. Mus., Quebec. Fair.

Eulophus tricladius. Type.—Harrington Coll. Paratype, yellow label 1374; blue label 754. 2nd Coll. Pub. Mus., Quebec. Fair.

Eumenes cinctus. Type.—Female, round disk, yellow label 1643. 2nd Coll. Pub. Mus., Quebec. Poor condition, dirty, etc.

Eumenes crucifera. Type.—Female Cat. No. 1978, U. S. Nat. Mus.

Eumenes flavopictus. Type.—Female, round disk, yellow label 1644. 2nd Coll. Pub. Mus., Quebec.

Eumenes impunctus. Type.—Female, round disk, yellow label 1642. 2nd Coll. Pub. Mus., Quebec.

Euphorus cephalicus. Type.—Male, yellow label 1118. 2nd Coll. Pub. Mus., Quebec. One antenna gone, other showing 8 joints. Poorly tag-mounted.

Euphorus punctatus. Type.—Male, yellow label 991. 2nd Coll. Pub. Mus., Quebec. Badly pinned; head missing.

Euplectrus lucens. Type.—Yellow label 1369. 2nd Coll. Pub. Mus., Quebec. Fair.

Euplectrus mellipes. Type.—Female, Harrington Coll. Antennæ broken, one complete to fourth funicle joint. Paratype.—Yellow label 1363. 2nd Coll. Pub. Mus., Quebec. Two specimens, both badly glued.

Euplectrus viridæneus. Type.—Yellow label 1382; blue 771(s). 2nd Coll. Pub. Mus., Quebec. Fair.

Eurytoma conica. Type.—Harrington Coll.

Eurytoma nigricoxa. Type.—Harrington Coll.

Eustalocerus fasciatus. Type.—Female, blue label 701(s), yellow label 1281. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Eustalocerus longicornis. Type.—Female, yellow label 1280. 2nd Coll. Pub. Mus., Quebec. Antennæ and hind tarsi, broken.

Eustalocerus petiolatus. Type.—Female, yellow label 1083. 2nd Coll. Pub. Mus., Quebec. Left antenna, median and posterior legs on left, missing.

Eustalocerus tauricornis. Type.—Female, yellow label 566. 2nd Coll. Pub. Mus., Québec. One antenna gone.

Euura nigra. Type.—Yellow label 1538. 2nd Coll. Pub. Mus., Québec. Another specimen with small, white label "161."

Euxorides vancouverensis. Type.—Female, yellow label 1556. 2nd Coll. Pub. Mus., Québec. Lacks flagellum.

Exenterus canadensis. Type.—Not located. Allotype.—Female, yellow label 953. 2nd Coll. Pub. Mus., Québec.

Exenterus hullensis. Type.—Male, Harrington Coll. Pink label "P. 581." Allotype.—Female, blue label 468, yellow label 1238. 2nd Coll. Pub. Mus., Québec.

Exetastes albitarsis. Type.—Female, yellow label 376. 1st Coll. Pub. Mus., Québec.

Exetastes brevipennis. Type.—Not in Pub. Mus., Québec, unless under *Mesostenus promptus* Cress.

Exetastes clavatus. Type.—Not located.

Exetastes matricus. Type.—Female, yellow label 531. 2nd Coll. Pub. Mus., Québec. Right antenna at scape, left before the middle, anterior and median legs on right at coxæ gone.

Exetastes rufofemoratus. Type.—Female, yellow label 310. 2nd Coll. Pub. Mus., Québec.

Exetastes rufus.—See *Ceratosoma*.

Exochilum nigrum. Type.—Female, yellow label 279. 2nd Coll. Pub. Mus., Québec. Left antenna gone, right broken at apex, hind tarsi broken at third joint.

Exochus rufomaculatus. Type.—Female, blue label 562. 2nd Coll. Pub. Mus., Québec.

Exolytus politus. Type.—Female, yellow label 365. 1st Coll. Pub. Mus., Québec.

Exyston marginatum. Type.—Not in Pub. Mus., Québec. Probably returned to collector.

Exyston variatus. Type.—Male, yellow label 324. 2nd Coll. Pub. Mus., Québec.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A LITTLE KNOWN CUTWORM, *Euxoa excellens* Grt.*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, IN CHARGE
OF FIELD CROP INSECT INVESTIGATIONS, DOMINION
DEPARTMENT OF AGRICULTURE.

In the Province of British Columbia the caterpillars of *Euxoa excellens* Grt. have been abundant enough during certain years to effect important damage to vegetables of several kinds.

HABITS AND LIFE-HISTORY

The first year of which we have record of this species as an economic pest is 1885. In Fletcher's report for 1903,† it is stated that in 1885, the cutworm was a perfect plague in market gardens around Victoria. Larvæ from British Columbia were also received at Ottawa in 1888, and referred to in Fletcher's report for that year under the name of *Agrotis obeliscoides* Gn. In 1903,‡ the species was again troublesome on Vancouver Island. Since this latter year we have received no reports of injury by this cutworm until 1916, when under date of May 30, the late Mr. Tom Wilson, a valued officer of the Entomological Branch, reported an outbreak in the neighbourhood of Sechelt, which is a short distance north of Vancouver. The caterpillars had cut off various kinds of garden plants and apparently their feeding habits are similar to those of the better known surface-feeding species of the genus *Euxoa*. In some gardens three sowings of spinach, lettuce, onion, etc., had been made before the end of May.

Larvæ received at Ottawa in June, 1916, pupated early in July. Three specimens which changed to pupæ on July 2, produced the moths on July 29 and 30. Other moths emerged in

*Contribution from the Entomological Branch.

†Rept. Ent. & Bot., Exp. Farms, Ottawa, 1904.

‡Idem, p. 183, under *Paragrotis perexcellens*.

August. In the collections at Ottawa there are three specimens which were reared by Fletcher in 1885 from larvæ collected in May, the dates of emergence being Aug. 15, 18 and 22, respectively. From our records of captured specimens, the moths of *Euxoa excellens* are on the wing in British Columbia in the latter half of the month of August and during September. The species is widespread in distribution, being known to occur in the United States, in the States of Oregon, Colorado (in September), and California (in September and October). The species was described from Vancouver Island specimens.

Nothing definite is known regarding the early life-history of the insect. From our present knowledge it would appear as if the winter is passed in the egg stage. Possibly during certain seasons hibernation may also occur in a young larval condition.

DESCRIPTIONS.

Mature Larva. Length 40 mm. Head 3.0 to 3.2 mm. wide, rounded, pale brown, conspicuously spotted with dark brown; ocelli black. General colour of body, dull grayish-white. Thoracic shield pale brown spotted and blotched with darker brown and divided by dorsal and subdorsal stripes. Dorsal, subdorsal and lateral stripes whitish, all uneven but distinct. Stigmatal band also whitish, uneven, and broken in places. Ventral surface paler than dorsal surface. Tubercules brown, conspicuous, setæ pale. Spiracles black. Anal flap pale brown, blotched with darker brown. Feet pale, the thoracic feet tipped and spotted with brown. Before pupating the markings on the body become faint.

Pupa. Length 18-19 mm., width 6.0-6.5 mm., at widest part; colour chestnut brown, shining. Posterior half of abdominal segments mostly finely pitted. The cremaster bears two stout spines in addition to which there are nearby four other smaller spines. The two stout spines and two of the other smaller ones are in a line; the remaining anterior two which are dorsal spines are strongly reclinate.

The earthen cell is similar to that made by other cutworms of the genus. It varies in size from about 20-22 mm. in length, to about 10-11 mm. in width, inside measurements.

The Moth.—The moth is a rather striking species. With the wings spread it measures from about 37 to 45 mm. in width. The fore wings of the male are dark purplish brown shaded along the lower edge, and in the space about midway between the reniform and outer edge with dull red. The costal area is similarly coloured. In the female all such areas are of a grayish-white colour. The orbicular and reniform spots are conspicuous in both sexes, being whitish with brown centre. A pale, apical spot is also present, as well as a short, pale dash adjoining the dark claviform. The transverse lines are pale. The hind wings in both sexes are whitish tinged with brown. The moth is figured by Hampson, Plate LXVI, 8 (Lep. B.M., Vol. IV).

NATURAL ENEMIES.

From the larvæ received in 1916 we reared at Ottawa several specimens of ichneumonid parasites of two species, namely, *Amblyteles subfuscus* Cress., and *Amblyteles nuncius* Cress.,* both species of which emerged in August.

In addition to these parasites an important percentage of the larvæ were destroyed by the fungus known as *Sorospora uvella*, the disease being so determined by Dr. Roland Thaxter.

CONTROL.

At the time of Mr. Wilson's visit to Sechelt at the end of May the efficacy of the well-known poisoned bran remedy was explained and its immediate use was urged. Reporting further under date of June 19, Mr. Wilson stated, "I am glad to report that where my instructions were carried out the cutworms were destroyed to the extent of 95 to 100 per cent. I asked the Sister Superior at the school to have the mixture of bran, Paris green and molasses, applied and to leave a certain number of check rows without any treatment. The untreated check rows have been eaten as bare as the road, not a vestige of plant life remaining, while the other rows have not lost a plant since the mixture was applied."

*Both species determined by Mr. W. H. Harrington.

NEW NORTH AMERICAN PHYCITINÆ.

BY WM. BARNES, S.B., M.D., AND J. McDUNNOUGH, PH.D.,
DECATUR, ILL.

***Rhodophæa bicolorella*, sp. nov.**

Palpi collar and patagia blue-black, thorax and abdomen ochreous; primaries with the costo-basal half blue-black, streaked with pale gray; median area of wing and inner margin broadly to t. p. line ochreous, shading into ruddy-brown before t. p. line; terminal area blue-black, sprinkled with pale gray; t. p. line indicated in costal portion as the outer border of dark area, obsolete in lower half, reniform faintly visible as a large oval filled with paler shading; t. p. line distinct, black, bordered outwardly by white line, rigid to vein 5, then slightly bulging and a little irregular to vein 2, with slight inward angle in fold, preceded by slight dark shading in costal and central areas; terminal dark line; fringes smoky. Secondaries hyaline with slight smoky outer border. Expanse 22 mm.

Habitat.—Christmas, Gila Co., Ariz.; Redington, Ariz. 4 ♂'s.
Types, Coll. Barnes.

The type of maculation is essentially that of *hystriculella*, but the ochreous and ruddy central and inner areas render the species easily recognizable.

Genus ***Acroncosa***, nov. gen. (Type *A. albiflavella*, sp. nov.)

Fore tibia with long inner and short outer claw; ♂ antennæ ciliate, without scale-tuft but with row of minute scale-ridges on upper side in basal portion; labial palpi somewhat ascending, moderate, smoothly scaled; maxillary palpi scaly, appressed, slightly fan-shaped; primaries 11-veined, 2 and 3 well separated and sub-parallel, 4 and 5 from a point, 8 and 9 stalked, 10 separate; secondaries 8-veined, discal vein strongly outcurved, the lower angle of cell being produced to a point, vein 2 well before this angle, 3 from angle, 4 and 5 long stalked, 4 in line with discocellular, 8 distinct, shortly stalked from 7.

This genus is, as far as we know, the first instance of a Phycid with clawed fore-tibiæ, and should be readily recognizable by this feature.

A. albiflavella, sp. nov.

Palpi, head and thorax white, patagia orange with a tinge of this colour on front and on metathorax; primaries white with sparse black sprinkling; inner margin at base orange; t. a. line a broad, oblique band of orange with a small, black spot on its inner side above inner margin; discal spot distinct, black; t. p. line orange close to outer margin and subparallel to same, with small, black costal patch beyond it and faint, black shade preceding it; secondaries hyaline smoky; fringes white; abdomen ochreous. Expanse 20 mm.

Habitat.—Loma Linda, S. Bern. Co., Calif. (July, Aug.) 6 ♂'s, 5 ♀'s. Types, Coll. Barnes.

We have a number of specimens from Ft. Wingate, N. M., very similar in maculation, but with the primaries much more heavily sprinkled with gray-black scales; for this apparently good racial form from the Rocky Mt. region we propose the name *castrella*, our types being 3 ♂'s, 4 ♀'s captured in July-August.

Acroncosa similella, sp. nov.

Very similar to the race *castrella* of the preceding species but larger, with longer primaries which are still more heavily suffused with blue-black than in *castrella*; the orange t. a. band is not continued to costa but stops at median vein, and is followed by a whitish, curved line starting from a similar coloured costal blotch beyond which is a dark, oblique streak; median area heavily shaded with a very prominent black, elongate discal spot; orange t. p. line much reduced, defined inwardly by white line preceded by heavy dark shading; distinct, dark apical dash; secondaries smoky hyaline with a darker marginal border and white fringes. Expanse 22 mm.

Habitat.—Pyramid Lake, Nevada (May). 5 ♂'s, 2 ♀'s. Types, Coll. Barnes.

We also possess the species from Eureka, Utah. (June 2).

Pyla fasciella, sp. nov.

Head, thorax and primaries deep blue-black with considerable bluish iridescence, but with only a trace of the bronze or green metallic scaling found in *scintillans* or *rainieri*; the median portion of the wing is crossed by a broad, darker band, showing

less iridescence, the inner edge of which (t. a. line) is a little less than half way from base of wing and is rather rigidly oblique outwardly, the outer edge (t. p. line) is gently rounded outwardly opposite cell from a point three-quarters from base to apex of wing; secondaries deep brown with darker fringes. Beneath unicolorous black-brown, rather shiny. Expanse 21 mm.

Habitat.—Mt. Shasta, Calif. (July 24-31) (McDunnough) 4 ♂'s, 1 ♀. Types, Coll. Barnes.

This species is the darkest of its group,—the lack of bronze or green scaling and the presence of the darker median band rendering it readily distinguishable from its allies; the type specimens were captured at an altitude of about 7,500 feet in very fresh condition, so that the general lack of metallic scaling may be considered normal.

***Pyla viridisuffusella*, sp. nov.**

Head, thorax and primaries heavily suffused with metallic green scaling, the latter with the cross lines broadly marked in blackish, t. a. line outwardly oblique, a little irregular, t. p. line bent somewhat outward beyond cell; at times a faint discal streak is visible. Secondaries deep black-brown; beneath unicolorous black-brown. Abdomen and legs with metallic green scaling. Expanse ♂ 18 mm., ♀ 17 mm.

Habitat.—Tuolumne Meadows, Calif. (Aug. 1-7) 7 ♂'s, 4 ♀'s. Types, Coll. Barnes.

Readily separated from *scintillans* by its smaller size and brilliant, green scaling without any of the bronze shades found in this latter species; it is apparently common at high altitudes throughout the Southern Sierras, as we have a series of it from Mineral King, Tulare Co., as well as our type lot from the Yosemite region.

KEY TO THE SUBFAMILIES OF ANTHOMYIIDÆ

BY J. R. MALLOCH, URBANA, ILL.

I present herewith a key to the imagines of the subfamilies of the dipterous family Anthomyiidae. The divisions I have adopted differ very considerably from those of European authors, as one may gather from either the names or a study of specimens with

the key as a basis. I have in manuscript keys to the genera of these subfamilies, which I hope soon to publish.

The subfamily divisions here adopted are based upon larval and pupal as well as imaginal characters.

MALES.

1. Sixth vein very short, seventh bent abruptly forward round apex of sixth.....*Fanniinae*
- Sixth vein complete or incomplete, seventh never bent abruptly forward as above.....2
2. Sixth vein complete; under surface of scutellum usually with soft, upright hairs at apex; hind metatarsus with a strong bristle at base ventrally.....*Anthomyiinae*
- Sixth vein complete or incomplete; under surface of scutellum never with hairs at apex; if hind metatarsus has basal bristle the eyes are widely separated and the frons is parallel-sided.....3
3. Centre of pteropleura with a conspicuous group of long hairs; eyes widely separated; palpi conspicuously dilated....*Lispinae*
- Centre of pteropleura without a conspicuous group of hairs....4
4. Eyes usually contiguous or subcontiguous, rarely separated by nearly one-third the width of head, if the latter then the cruciate frontal bristles are absent; sternopleurals 2 to 4 in number, when 3 are present they are not arranged in a nearly equilateral triangle.....5
- Eyes separated by at least the width of head, cruciate frontal bristles present only when the sternopleurals are not arranged in a nearly equilateral triangle.....6
5. Fore femora simple; sternopleural bristles almost invariably 3 (1:2) or 4 (2:2) in number; if only 2 (1:1) are present the prealar bristle is clearly distinguishable.....*Phaoniinae*
- Fore femora excavated on under surface near apex and with 1 or more stout thorns basad of the excavation, or if the fore femora are simple the prealar bristle is absent and, as in the previous group, there are only 2 (1:1) sternopleurals present.....*Hydrotæinae*

- Cruciate frontal bristles present; sternopleurals not in a nearly equilateral triangle; hind metatarsus with basal ventral bristle.....*Fucellinae*
- Cruciate frontal bristles absent; sternopleurals in a nearly equilateral triangle; hind metatarsus without basal ventral bristle.....*Cænosiinae*

FEMALES

1. Sixth vein very short, seventh abruptly bent forward round apex of sixth; lower orbital bristle directed outward over eye.....*Fanniinae*
- Sixth vein complete or incomplete, seventh not abruptly bent forward round apex of sixth; lower orbital either directed forward or inward.....2
2. Sixth vein complete; under surface of scutellum usually with soft, upright hairs at apex; hind metatarsus with basal ventral bristle.....*Anthomyiinae*
- Sixth vein complete or incomplete; under surface of scutellum never with soft, upright hairs at apex.....3
3. Cruciate frontal bristles absent.....4
- Cruciate frontal bristles present.....6
4. Pteropleura with a conspicuous group of setulose hairs in centre; palpi much dilated apically.....*Lispinae*
- Pteropleura without a conspicuous group of setulose hairs in centre.....5
5. Sternopleural bristles 2 to 4 in number, if 3 are present they are never arranged in a nearly equilateral triangle.....*Phaoniinae*, pt.
- Sternopleural bristles almost invariably 3 in number, arranged in a nearly equilateral triangle.....*Coenosiinae*
6. Sixth vein complete; hind metatarsus with strong, basal, ventral bristle.....*Fucellinae*
- Sixth vein incomplete; hind metatarsus without distinct basal ventral bristle.....7
7. Sternopleural bristles 2 (1:1) in number; dorso-centrals always 4 in number.....*Hydrotæinae*
- Sternopleural bristles 3 (1:2) or 4 (2:2) in number; dorso-centrals 3 or 4 in number.....*Phaoniinae*, pt.

THE KNOWN NYMPHS OF THE NORTH AMERICAN SPECIES OF SYMPETRUM (ODONATA).

BY E. M. WALKER, TORONTO.

Of the eleven North American species of *Sympetrum*, generally recognized, the nymphs of all but two have been reared or determined with practical certainty. These two are *S. ambiguum* (Ramb.) and *S. madidum* (Hag.). Of the nine others I have examined nymphs of all except *S. corruptum* (Hag.) and *S. illotum* (Hag.). These, however, have been sufficiently described and figured by Needham¹ to make possible their inclusion in the key given below.

In addition to material collected by myself I have examined a considerable number of specimens kindly lent me by Prof. Needham, and also an exuvia of *S. scoticum* Donovan, with the imago which emerged from it, found at Red Deer, Alta., by Mr. F. C. Whitehouse, who kindly gave the specimens to me.

The study of these *Sympetrum* nymphs has been unusually difficult, and the results are far from satisfactory. Variation within the limits of the species is generally so great that it is seemingly impossible, in most cases, to find any constant character by which a particular species may be recognized with certainty. For this reason the key which is given here must be used with a great deal of caution.

I have not included in the key the form which I consider to be typical *S. rubicundulum*, as I have not reared it nor seen nymphs which I could safely assign to this race. I have, however, several specimens of the nymph of *S. rubicundulum decisum* (Hag.) from Prince Albert, Sask., but they differ from Needham's description of *rubicundulum*² in the extreme reduction of the dorsal hooks and are readily separated from my nymphs of *obtrusum*. Needham reared both of these species and found no differences between them. This matter will be more fully discussed later.

The nymph of *Sympetrum* may be characterized as follows: Head rather large, the width across the eyes being little less than that of the abdomen, not more than twice as broad as long; eyes

1 Bull. 68, N. Y. State Mus., 1903, pp. 271-273, No. 16, 17; Bull. 47, N. Y. State Mus., 1901, pl. 25, fig. 1.

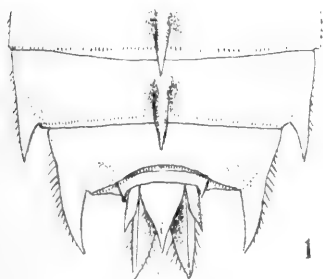
2 Bull. 47, N. Y. State Mus., 1901, p. 525.

moderately to decidedly prominent; lateral margins very oblique, curving into the straight, posterior margin with no indication of an angle. Labium reaching caudad to the middle coxæ, scarcely longer than broad, the middle lobe obtusangulate, mental setæ usually 13 to 15, lateral setæ usually 9-11 but sometimes more, inner margins of lateral lobes with very low crenulations, the marginal spinules in groups of 2 to 4, of which one is much the longest, movable hook slender, rarely more than half the length of the lateral margin. Abdomen ovate, but little depressed, broadest at segment 6, narrowed more abruptly caudad than cephalad; dorsal hooks never present on segs. 1 to 3 nor on 9 and 10, usually shorter than the segments which bear them; lateral spines on segments 8 and 9 or on 9 only, generally shorter than their respective segments; superior appendage triangular, but little longer than broad, acuminate, with a very slender pointed apex, lateral appendages about half as long as inferior appendages, the latter generally acuminate, fine-pointed and decidedly longer than the superior appendage.

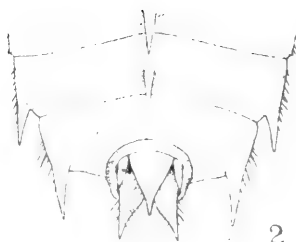
The nymphs of *Sympetrum* are very like those of *Leucorrhinia*, and there seem to be no good characters for separating them generically. (See Can. Ent., 1916, vol. XLVIII, p. 414.)

KEY TO THE NYMPHS OF NORTH AMERICAN SPECIES OF SYMPETRUM.

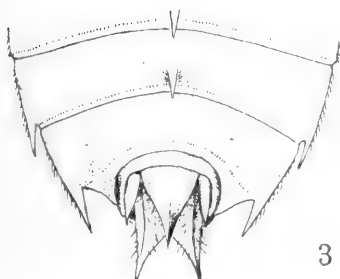
1. Segs. 8 and 9 with lateral spines, dorsal hooks present (except in some individuals of *S. rubicundulum decisum*).....2
 - Seg. 8 without lateral spines, those of seg. 9 vestigial, dorsal hooks entirely absent.....8
2. Dorsal hooks on segs 6-8 as long as the segments which bear them, lateral spines of segs. 8 and 9 subparallel, those of seg. 9 as long as the lateral margins of the segment (not including spine) and reaching back as far as tip of superior appendage; eyes prominent.....3
 - Dorsal hooks shorter than the segments which bear them; lateral spines more or less convergent, their outer margins continuing the general curve of the abdominal margins; those of seg. 9 shorter than the lateral margins of the seg-



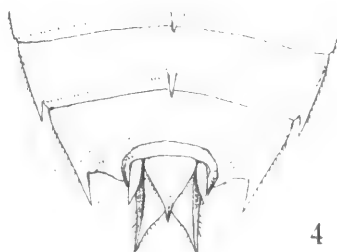
1



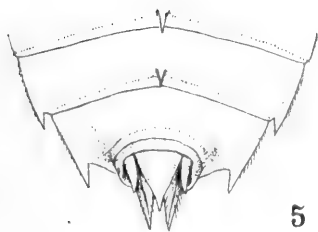
2



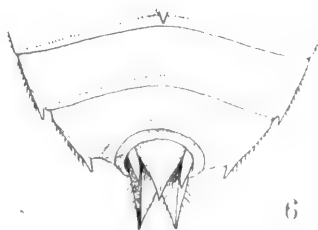
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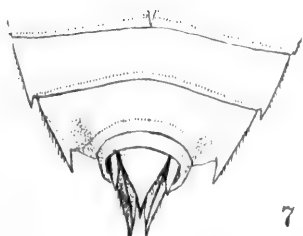
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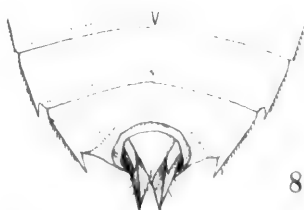
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NYMPHAL STRUCTURES OF SYMPETRUM.
(See p. 418.)

- ment and not reaching as far back as tip of superior appendage; eyes moderately prominent.....4
3. Lateral spines of seg. 8 scarcely twice, those of seg. 9 $2\frac{1}{2}$ times, as long as their basal breadth, outer margins of latter distinctly incurvate; lateral appendages half as long as the inferiors, the latter not acuminate.....*semicinctum*
- Lateral spines of seg. 8 more than twice, those of 9 three times, as long as basal breadth, outer margins of latter nearly straight, lateral appendages less than half as long as the inferiors, the latter apically acuminate.....*vicinum*
4. Lateral spines of seg. 9 not less than two-fifths as long as the lateral margin of the segment, dorsal hooks well developed, slender and very acute, that of seg. 7 nearly as long as the mid-dorsal line of the segment, that of 8 usually more than half as long as the segment.....5
- Lateral spines of seg. 9 not more than one-third as long as the lateral margin of the segment, dorsal hooks smaller and when well developed somewhat stouter and distinctly curved, that of seg. 9 distinctly shorter than the segment, that of seg. 8 rarely half as long as the segment.....6
5. Base of mentum of labium distinctly broader than middle coxæ and somewhat more than one-fourth the greatest width; lateral spines of seg. 9 usually at least half as long as lateral margins of the segment; lateral setæ typically 11.....*costiferum*
- Base of mentum of labium scarcely, if at all, broader than middle coxæ and about one-fourth of the greatest width, lateral spines of seg. 9 two-fifths to one-half as long as lateral margins of the segment; lateral setæ typically 10.....*pallipes*
6. Dorsal hooks present on segs. 4 to 7 or 8, sometimes absent from seg. 4 or 8, lateral spines of seg. 9 about one-third as long as the lateral margins of the segment, lateral setæ 9 to 11.....7
- Dorsal hooks present on segs. 5 to 7 only, vestigial, or absent altogether, lateral spines of seg. 9 about one-fifth as long as lateral margins of the segment, lateral setæ usually 11.....*rubicundulum decisum*

7. Lateral setæ 11, dorsal hooks vestigial or absent from segs. 4 and 8.....*scoticum*
 Lateral setæ 9 or 10, dorsal hooks somewhat larger, generally present, though small, on segs. 4 and 8.....*obtrusum*
8. Lateral setæ 9, mental setæ about 13, 7 in the stronger, outer series.....*illotum*
9. Lateral setæ 13-14, mental setæ about 17, 9 in the outer series.....*corruptum*

***Sympetrum semicinctum* (Say).**

I have seen but one specimen of this species, received from Prof. Needham. Its characters seem quite distinctive. The comparatively blunt, inferior appendages distinguish it from all other species I have seen. It was described and figured by Needham in Bull. 47, N. Y. State Mus., p. 523, pl. 25, f. 2.

***Sympetrum vicinum* (Hagen).**

The prominent eyes, large, dorsal hooks and long, slender lateral spines render this an easily recognized species. I have examined a considerable number of specimens from various localities and have reared it several times, both in Ontario and on Vancouver Island. It has been described by Needham (l. c., p. 522).

***Sympetrum costiferum* (Hagen).**

This species was described by Needham from a single, somewhat collapsed exuvia. The dorsal hooks on segments 6-8 are described as being about as long as their respective segments. They are usually somewhat shorter.

I have not actually reared this species, but I found a freshly-emerged male with its exuvia in a shallow reed-bed at the edge of a lake on Gabriola Island, B.C., Aug. 12, 1913. I also found a number of exuviae on small reeds in a shallow, sand-bottomed lagoon on the Giant's Tomb Island, Georgian Bay, Ont., July 29, 1908. Adults of *S. costiferum* were flying here in abundance. I have also a few nymphs dredged from several localities in Georgian Bay.

The nymph is easily distinguished from that of *S. obtrusum* by the larger size and longer lateral spines and dorsal hooks, the

latter being also straighter and more slender. The lateral setæ vary from 10 to 12, but are 11 in the great majority of cases. The mental setæ vary from 13 to 18 but are usually 14 or 15, with 8 to 10 in the stronger, outer series.

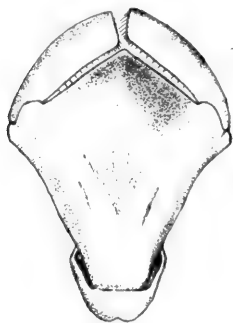


Fig. 40.—*Sympetrum pallipes*, labium of nymph from below.

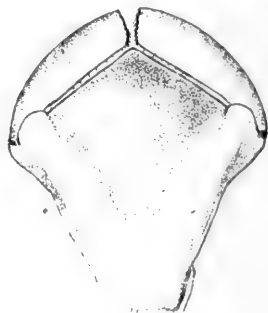
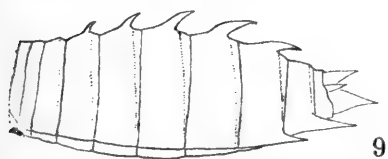


Fig. 41.—*Sympetrum costiferum*, labium of nymph from below.

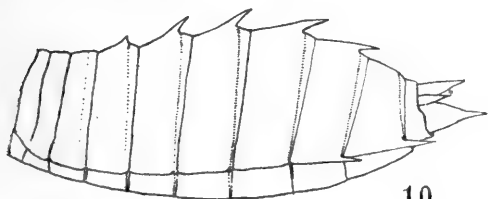
***Sympetrum pallipes* (Hagen).**

This species, which I reared in 1913 from nymphs taken from small pools near Rock City, Vancouver Island, is extremely like *S. costiferum*, though the adults are not closely related. It was described in Can. Ent., 1914, vol. XLVI, p. 373, pl. XXV, Figs. 6-8. The lateral spines of segment 9 are usually, but by no means always, shorter than in *costiferum*, and the lateral lobes of the labium tend to be somewhat more spinulose, the main spinules of the inner margin being accompanied by two or three smaller ones forming a graded series. In *costiferum* these accessory spinules are generally fewer and shorter, some of the larger ones being single. (See Can. Ent., loc. cit., pl. XXV, Figs. 8 and 12) but this character is too variable to be of much value as a differential. The labium is somewhat more slender and more narrowed at base, being similar in form to that of *obtrusum*. This character is apparently a good one but is difficult to appreciate without examining good series of both species. The lateral setæ are usually 10, sometimes 11; the mental setæ vary from 12 to 15.

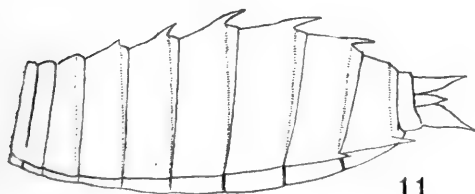
Judging from my limited experience in collecting the nymphs of these two species, it would appear that they are ecologically distinct, *costiferum* being an inhabitant of shallow, marshy bays



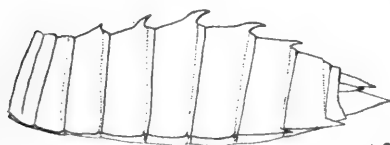
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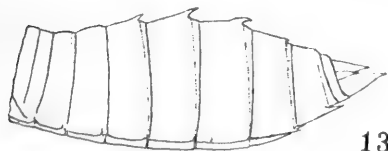
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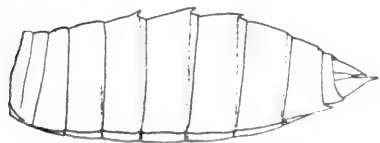
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19

NYMPHAL STRUCTURES OF SYMPETRUM.

(See p. 418.)

and lagoons, while *pallipes*, like its near relative *obtrusum*, prefers small, semi-permanent ponds and puddles.

***Sympetrum obtrusum* (Hagen).**

The nymph of *obtrusum*, of which I have bred several specimens of both sexes, is very like that of *pallipes* but is somewhat smaller and the shorter dorsal hooks and lateral spines seem to be good characters, though the opposite extremes in the two species approach one another closely. The lateral setæ are normally 10, the basal one being, however, very small and sometimes absent. The mental setæ are usually 12 or 13, occasionally 14.

***Sympetrum rubicundulum* (Say).**

As already mentioned, the nymph of this species has been described by Needham³ and the characters as given in his description apply equally well to *S. obtrusum*, from which he was unable to distinguish it. Specimens of nymphs and exuviae from a puddle at Prince Albert, Sask., where I found *S. rubicundulum decisum* (Hag.) emerging, differ from *obtrusum* in the great reduction or even absence of the dorsal hooks, and in the smaller lateral spines. These characters appear to be good but I have only seven specimens, and the variation among them is considerable.

During early July, 1917, I found a number of *Sympetrum* nymphs in several small puddles at De Grassi Point, Ont., and before any of them had emerged, tenerals of *S. rubicundulum* were found flying in the vicinity of the puddles. Unfortunately I was unable to attend properly to the nymphs and only two emerged, both females. One of them has an exuvia with extremely vestigial dorsal hooks like the Prince Albert specimens, and the imago seems to differ in no way from *decisum*, while the exuvia of the other is like *obtrusum* and the adult is very similar to the former specimen, but may be *obtrusum*, for I find it sometimes impossible to distinguish between the females of these two species.

These difficulties with the nymphs led me to a closer study of the imagos, with unexpected results. There seem to be two forms of what we have been calling *rubicundulum* in Canada and the Eastern United States. One of these is apparently the same species as the western *decisum*, and this is the form of which I found tenerals emerging at De Grassi Point. It occurs across Canada from Prince Edward Island to British Columbia. The

³ Loc. cit., p. 525.

other I have from De Grassi Point and Toronto only among Canadian localities and also from Bluffton, Ind., and Cedar Rapids, Iowa. It may be only a southern race of the same species, but it appears to me to be distinct in both sexes from *decisum*. The latter is, in some respects, intermediate between the southern form and *obtrusum*, but certainly does not intergrade with the latter. The question of the characteristics and status of these forms of so-called *rubicundulum* will be more fully discussed in a future paper.

***Sympetrum scoticum* (Donovan).**

The exuvia from Red Deer, Alta., already mentioned as having been taken by Mr. Whitehouse with the imago is all I have from North America to represent the nymph of *S. scoticum*, but I found this species emerging from a pond in the Harz Mountains, Germany, in 1906, and have several of the exuviae, though they are, for the most part, in fragments. In most of these there is a minute denticle to represent the dorsal hook of segment 8, but in one of them and in the Red Deer specimen there is no indication whatever of this structure. There is some variation also in the length of the lateral spines, one of them having them scarcely longer than in the Prince Albert specimens of *decisum*. It is very probable that no external characters exist by which *scoticum* and *decisum* can be separated with certainty. The number of lateral setae is normally 11, sometimes 12, and the mental setae vary from 13 to 15, with 7 to 9 in the outer series.

The colour pattern, as in most species of *Sympetrum* is very indistinct and offers no characters of any value.

***Sympetrum illotum* (Hagen).**

The nymph of this western species has not been fully described, but a figure is given by Needham,⁴ who has also noted⁵ the chief characters by which it may be distinguished from its nearest relative, *S. corruptum*.

***Sympetrum corruptum* (Hagen).**

The nymphal characters of this species have been described by Needham⁶ from specimens taken in transformation by Prof. T. D. A. Cockerell at Tempe, Ariz., and Las Vegas, N. M.

⁴ Loc. cit., pl. 25, fig. 1.

⁵ Bull. 68, N. Y. State Mus., p. 272, 1903.

⁶ Loc. cit., p. 271, fig. 16.

EXPLANATION OF PLATES XIX AND XX.

- Fig. 1—8.—Apical abdominal segments of *Sympetrum* nymphs dorsal view. 1, *S. semicinctum*; 2, *S. vicinum*; 3, *S. costiferum*; 4, *S. pallipes*; 5, *S. obtrusum*; 6, *S. rubicundulum decisum*; 7, *S. scoticum*; (Red Deer, Alta.); 8, *S. scoticum* (Harz Mts., Germany.)
- Fig. 9—14.—Left lateral view of abdomen of *Sympetrum* nymphs. 9, *S. vicinum*; 10, *S. costiferum*; 11, *S. pallipes*; 12, *S. obtrusum*; 13, *S. scoticum*; 14, *S. rubicundulum decisum*.
- Figs. 15—19.—Dorsal view of head of *Sympetrum* nymphs. 15, *S. semicinctum*; 16, *S. vicinum*; 17, *S. pallipes*; 18, *S. scoticum*; 19, *S. rubicundulum decisum*.

OBSERVATIONS ON *CHIRONOMUS DECORUS*
JOHANNSEN.*

BY CHI PING, ITHACA, N.Y.

Chironomus decorus Johannsen is a common species found about Ithaca. The larva, pupa, and imago have been described† but its egg stage was missing, and its habits and development were hitherto unknown. The present work records my observations made in the summer of 1915.

Flying and mating.—The adults begin to swarm at sunset and continue into the twilight. At first one or two come out from the grasses, rushes and sedges growing along the shores of pools or ponds where they spent the day. They fly very slowly at first. Later on, as more and more come out and join them, they become more active. As the nightfall commences they can only be seen outlined against the sky. A swarm is often found overhead, from 10 to 15 feet above the ground. The swarm continues to increase in size, until a column may be formed about 5 feet in height and 1 foot in diameter, with its base about 5 feet above the ground.

While engaged in dancing, all the midges have their heads pointing in the same direction, with their bodies moving back and forth and up and down, sometimes with great rapidity. The

*Contribution from the Limnological Laboratory of Cornell University, Ithaca, N. Y.

†Johannsen, O. A., Bull. 86, N. Y. State Mus., p. 239.
December, 1917

colour of the insects is much lighter than that of other species of the same size so they may be easily recognized upon the wing. From time to time females appear in the swarm. The male chases the female in a spiral course, the two together appear like a single individual. Instead of dropping down, as some species do, they mate in their spiral course toward the summit of the column where they are lost to sight. From the beginning of mating till they disappear in the darkness it requires about 3 minutes.

Oviposition and eggs.—Observations were made during the night of July 30, 1915, on some captured individuals. Oviposition took place about 5.45 a.m. The female alighted on a leaf of *Elodea*, raising her abdomen by drawing the hind legs close to each other, then flexed her abdomen with its tip pointing downward. On touching the leaf surface several times with the tip of the abdomen, some transparent globules were exuded. This was repeated after short intervals, and finally the abdomen was bent in a greater degree and its tip was pointing forward so as to touch the hind legs. The space between the abdomen and femora was about .5 to 1 mm. Suddenly a brown egg-mass was extruded and deposited on the hind femora. This mass was much condensed. The femora remain together to hold the mass on the dorsal side for 2 or 3 minutes after oviposition was accomplished; then by spreading the legs apart the egg-mass was thrown down on the side of the glass container. The mass gradually expanded, becoming fully distended upon touching the water. Later another egg-mass was found that had been dropped on an *Elodea* leaf by another female kept under similar conditions. The egg clusters collected at the shores of pools and ponds were found resting on the bottom in shallow water, floating below the surface or attached to some aquatic plants, depending on how the female throws the mass from her hind legs.

Each egg measures about .33 mm. long, and .12 mm. broad. It is more or less cylindrical at the middle and round at both ends. Its colour is pale brown, lighter than the eggs of other species, which I have observed, and hardly changes at all from the time when it is first laid until hatched. It has been estimated that there are about 700 eggs on the average in the whole cluster. The cluster averages 9 mm. in length and 5 mm. in width, slightly

elongated in an oval shape and a little arcuated. At one end of the cluster the gelatinous structure extends into a handle-like projection which is supposed the last portion of the egg-mass. Usually this cord is found to be much twisted and coiled. The unfertilized eggs remain undeveloped (Pl. XXI, fig. 1).

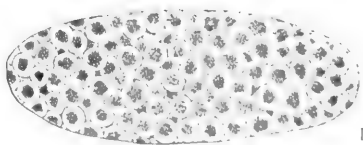
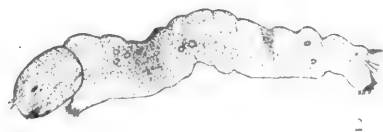
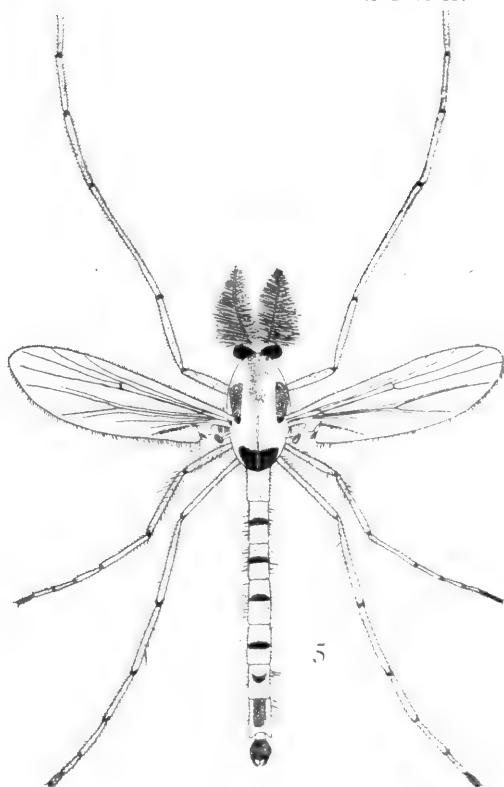
It was often noted that before the fertilized eggs begin to develop, 3 or 4 of them in the cluster were attacked by fungus. The fungous filaments growing on them look like the tentacles of hydra and sometimes become extremely elongated, branching out, to connect other eggs nearby in the gelatinous mass. They resemble a network, but are irregularly arranged. This growth checks the development of the eggs and destroys all the substance of them. The fungous disease generally starts from one or two eggs, gradually affecting more eggs and finally destroying the whole mass.

Larva.—When newly hatched, the pale, gray larva measures .8 mm. in length, with its head disproportionally large. The anterior and anal prolegs are short and stout, the claws of the latter pale and transparent. The body segments are not distinct. At this stage there are no appendages at all on the ventral surface of the eleventh segment, while on the caudal end of the twelfth segment there are but two gills. A median tuft of hairs occurs on the dorso-caudal portion of the twelfth segment (Fig. 4).

Later when the larva has attained the size of 1 to 1.5 mm. in length the head is more or less reduced in proportion, the body segments are more distinct and two more blood gills have grown out on the last segment.

When 3 mm. in length, the larva has assumed the general form of a fully grown individual. The body is now much larger in proportion to the head; the mandibles are slightly blackened at their tips, the eye-spots are black instead of red and the head darker. The curved hairs and claws on the prolegs are well developed and more distinct. One of the most noticeable changes in the young larva now is that the blood gills on the ventral surface of the eleventh segment are just budding out. The colour of the larva has now become pink.

The colour of the larva becomes red when it is about 5 mm. long. Excepting for the short gills curled together on the eleventh



CHIRONOMUS DECORUS JOHANNSEN. (See p. 418.)

segment, the larva resembles a fully grown one in every respect. The head is brownish, and when the larva attains a length of 8 mm., setæ have developed on it. There are a few setæ found on the first thoracic segment and the blood gills now hang straight down on the ventral side (Fig. 5).

At maturity the larva measures 11 to 12 mm. in length. The ventral blood gills are about 2 mm. long and longer than the anal legs or any of the body segments. Just prior to pupation the first and second thoracic segments become much swollen.

Growth of Larvæ.—The young larvæ emerged from eggs were placed in the individual test-tubes containing about 4 or 5 cm. of water. These test-tubes were placed obliquely in a dish immersed in water for about half their length to insure uniformity of temperature. They were exposed to sunlight during several hours of the day. Fresh food material and fresh water were added from time to time. A larva which had hatched on August 11, measured .8 mm. in length. On Aug. 19, it was 4 mm.; Sept. 7, 6 mm.; Sept. 11, 7 to 7.5 mm.; Sept. 16, 9.5 mm. The average room temperature was 18 to 19 degrees C. A second larva from another egg was hatched on Aug. 15; on Sept. 11 it measured 7 to 7.5 mm.; Sept. 16, 11 mm.; five days later it pupated. The average room temperature was the same as above. A third one hatched on Sept. 23; on Oct. 1 it reached 1.5 mm.; Oct. 11, 6 mm.; Oct. 23, 10.5 mm. The average room temperature was 10 to 11 degrees C. A fourth one hatched on Oct. 1; on Oct. 8 it measured 1 to 1.5 mm.; Nov. 21, 10.5 mm. The average room temperature was 7 to 8 degrees C.

The larval stage under the conditions stated lasts from 32 to 53 or more days. It is evident from the above that low temperature retards development. In the laboratory the reared larvæ were fed upon the finely ground leaves of *Potamogetons* and of leaves and stems of *Elodea*. Under the microscope I have observed a young larva of about 3.5 to 4 mm. long that had swallowed a piece of *Spirogyra* which filled up almost two-thirds of its alimentary canal.

Larvæ Living Outside of Water.—The larvæ of *C. riparius* have been found to be able to live in mud for a considerable length of time after the water is gone. Similarly the larvæ of *C. decorus*

can subsist without water, provided the condition is not too dry. In the laboratory I have some fully grown larvæ which had made their cases with their secretion and plant materials on the wall of glass containers when the water was present. Upon removal of the water they continue to live in their cases for almost a month until entirely dry.

Pupa.—Upon pupation the larval skin splits along the mid-dorsal line of the thorax, a part of the pupal thorax will emerge first, and the horn-shaped processes on the top of the head, the compound eyes, a part of the antennæ, and the tracheal filaments are now outside the skin. As the development advances, the skin splits further along the dorsal surface, a part of the pupa's body emerges, the compound eyes soon appear in a perfect shape, the tracheal filaments longer, and the legs of the imago have their claws, hairs and segments all visible through the transparent pupal sheath (Fig. 4).

Finally matured, its tracheal filaments are very bushy and white, and its antennæ brownish black. The abdomen is contracted within the pupal skin, leaving the last two segments empty. The genitalia of the adult are visible through the transparent skin. The mature pupa measures about 7 mm. in length and now becomes very active, swimming tadpole-like under the surface of water and moving its depressed abdomen very rapidly back and forth. The thorax closely touches the surface film with the respiratory filaments slightly indenting it. The anal appendages are much flattened and have matted hairs well developed for locomotion. While floating against the surface film it resembles in habit the mosquito wriggler. Sometimes it lies stationary beneath the surface.

Emergence of Adult.—The pupal skin splits longitudinally down the dorsum of the thorax. The head of the adult is pulled backwards and upward, and the mouth-parts, palpi and antennæ gradually emerge. The base of the wings and the legs soon appear. When the front and middle pairs of legs are freed, or almost so, the fly, in trying to raise its body, has its wings immediately straightened out. At this time a greater portion of the posterior legs and the entire abdomen are still retained within the pupal covering. The posterior extremity of the abdomen is always

freed last. The time required for a fly to free itself usually does not exceed one-quarter of a minute, and frequently it has been found that the extrication is accomplished within 4 or 5 seconds. It may even further be hastened if the water is suddenly jarred. In that case the adult can cast off the pupal skin in one second. Sometimes the fly fails to get out of the pupal covering, on account of pulling out the tip of the abdomen too soon. There is a natural order for the extrication of the different parts of the insect's body as mentioned above, any departure from which will result fatally.

Experiments Upon the Longevity of the Adults.—The following experiments were performed on the imagines reared in the laboratory. The imagines were confined immediately after their escape from the pupal skin. Their confinement was near a window where they were exposed to the sunlight during several hours of the day and care had been taken against excessive heat:

I. An imago was kept in a bell jar under which some lumps of CaCl_2 were placed. The humidity inside was reduced, practically to zero. The fly lived therein for only 24 hours. (Sept. 23-24).

II. An imago was kept in a jar in which the moisture was maintained in a moderate condition through the evaporation of the water in a small dish placed underneath. It lived for 45 hours. (Sept. 23-25.)

III. An imago was kept in a jar in which the moisture was maintained to saturation by keeping *Elodea* and *Sphagnum*, underneath by sticking a few pieces of fully saturated blotting paper to the inner surface of the glass and by wetting the cheese-cloth that covered the top from time to time. The fly favoured by such condition lived for six days. (Sept. 23-29).

Under natural conditions, in the day time they are found in the grasses, rushes and sedges growing on the shore in moist situations, and consequently, there is every reason to believe that the imagines may survive much longer in such places than in confinement.

Effect of Low Temperature, Wind and Smoke upon C. decorus.—The imagines behave themselves very much like other insects with regard to their activity under varying conditions of temperature. In the summer season, if it has been a clear, hot day, they are

always found swarming actively above pools, streams, lake-shores, and also above roadsides during sunset, but in cold weather the swarm is not likely to be seen and their activities have evidently been checked by the low temperature. On Aug. 27, at 5.30 a.m., when the temperature was about 5 degrees C., I observed imagines torpid and unable to fly even when disturbed. On slightly windy evenings, the swarm either does not occur or has a very short duration. Smoke has the same effect on a swarm. It has been found several times that in the Cascadilla Gorge the swarm was often dispelled by smoke from camp-fires even when at a considerable distance.

Number of Generations.—My observations made in the summer and fall of 1915 indicate that probably five generations may be developed in this locality. The number of generations was determined by the finding of egg-masses in ponds and dishes from time to time. The first appearance of egg-masses was in May and the first two weeks of June, the second in the last part of July, the third in the second week of August, the fourth in the first two weeks of September and the fifth in the middle of October.

Enemies.—The midge is apt to be attacked by enemies throughout all the stages in its life-history. The eggs are attacked by the fungous disease as already mentioned. I have observed a young larva preyed upon by a Cyclops. The crustacean held up the thorax of the little larva with its mouth-parts and gnathopods, sucking out the body fluids. After a while, the Cyclops shifted its mouth-parts toward the caudal end. By so doing, within ten minutes, the entire body of the larva was emptied of its contents. At this point another Cyclops came to participate in this work and wrested the prize away from the original possessor.

I have occasionally witnessed bats which preyed upon the adults by flying across the swarm.

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EXPLANATION OF PLATE XXI.

- Fig. 1.—Fertilized egg beginning to develop.
Fig. 2.—Young larva just hatched with only two anal gills.
Fig. 3.—Mature larva.
Fig. 4.—Pupa.
Fig. 5.—Adult male.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D. C.

(Continued from page 400.)

Figites inermis. Type.—Female, yellow label 619. 2nd Coll. Pub. Mus. Quebec.

Formica pallitarsis. Type.—Yellow label 925. 2nd Coll. Pub. Mus., Quebec. Fair.

Galesus quebecensis. Type.—Yellow label 912. 2nd Coll. Pub. Mus., Quebec.

Glypta californica. Type.—Female, white label 8, yellow label 1292. 2nd Coll. Pub. Mus., Quebec.

Glypta ruficornis. Type.—Male, yellow label 490. 1st Coll. Pub. Mus., Quebec. Bears name label *Glypta macra* Cress.

Glypta rugulosa. Type.—Yellow label 986. 2nd Coll. Pub. Mus., Quebec. Thorax and wings present.

Glypta tricincta. Type.—Not located.

Gonatopus decipiens. Type.—Yellow label 1332. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Gorytes armatus. Type.—Male, old rose label 256(s), blue label 845(s), yellow label 1434. 2nd Coll. Pub. Mus., Quebec.

Gorytes eximius. Type.—Male, white label 29(s), yellow label 1436. 2nd Coll. Pub. Mus., Quebec.

Gorytes laticinctus. Type.—Not located. Probably returned to collector.

Gorytes maculatus. Type.—Male, yellow label 1726. 2nd Coll. Pub. Mus., Quebec.

Gorytes ruficornis. Type.—Female, white label 36(s), yellow label 1435. 2nd Coll. Pub. Mus., Quebec.

Haltichella viridis. Type.—Blue label 110(s); yellow, 1394. 2nd Coll. Pub. Mus., Quebec.

Hedylus politus. Type.—See Introduction (Opiinae).

Helorus paradoxus. Type.—Female, yellow label 971.

2nd Coll. Pub. Mus., Quebec. Lacks head. Paratype in good condition.

Hemiteles aciculatus. Type.—Male, Harrington Coll. Pink label "P. 426." Lacks right antenna and apex of left.

Hemiteles caudatus. Type.—Female, yellow label 306. 1st Coll. Pub. Mus., Quebec. Lacks abdomen.

Hemiteles crassus. Type.—Male, yellow label 720. 2nd Coll. Pub. Mus., Quebec. Some tarsi gone.

Hemiteles debilis. Type.—Harrington Coll. One antennæ gone, other broken at apex.

Hemiteles declivus. Type.—Female, Harrington Coll. Antennæ gone. Paratype.—Old rose label 33, yellow label 1199. 2nd Coll. Pub. Mus., Quebec.

Hemiteles depressus. Type.—Not located.

Hemiteles gigas. Type.—Male, Harrington Coll. Pink label "P. 411."

Hemiteles humeralis. Type.—Female, yellow label 233. 2nd Coll. Pub. Mus., Quebec.

Hemiteles longicornis. Type.—Female, yellow label 671. 2nd Coll. Pub. Mus., Quebec.

Hemiteles mandibularis. Type.—Female, yellow label 307. 1st Coll. Pub. Mus., Quebec.

Hemiteles mucronatus. Type.—Male, blue label 213, yellow label 1198. 2nd Coll. Pub. Mus., Quebec. Lacks left fore wing.

Hemiteles nigricans. Type.—Male, yellow label 673. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone, wings crumpled.

Hemiteles orbicularis. Type.—Not in Pub. Mus., Quebec, unless under *Stilpnus americanus* Prov.

Hemiteles ovalis. Type.—Female, yellow label 316. 1st Coll. Pub. Mus., Quebec. Lacks right and apex of left antenna. Allotype.—Not located.

Hemiteles pallipennis. Type.—Female, yellow label 672. 2nd Coll. Pub. Mus., Quebec. Lacks left antenna and apex of right. Allotype.—In good condition, without labels. 2nd Coll. Pub. Mus., Quebec.

Hemiteles parvus. Type.—Male, yellow label 226. 2nd Coll. Pub. Mus., Quebec. Fair.

Hemiteles ruficoxus. Type.—Female, yellow label 228. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Hemiteles scabrosus. Type.—Female, yellow label 225. 2nd Coll. Pub. Mus., Quebec. Lacks apex of right flagellum.

Hemiteles semifurus. Type.—Female, yellow label 314. 1st Coll. Pub. Mus., Quebec. Without head.

Hemiteles sessilis. Type.—Female, yellow label 309. 1st Coll. Pub. Mus., Quebec.

Hemiteles subspinosus. Type.—Female, Yellow label 232. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Hemiteles tener. Type.—Male, yellow label 311. 1st Coll. Pub. Mus., Quebec. Somewhat damaged.

Hemiteles utilis. Type.—See *H. depressus* Prov.

Herpestomus pyriformis. Type.—Female, yellow label 200. 2nd Coll. Pub. Mus., Quebec.

Heteropelma longipes. Type.—Cat. No. 1966, U. S. Nat. Mus.

Holcopelte albipes. Type.—Yellow label 1378; blue 774(s). 2nd Coll. Pub. Mus., Quebec. Fair.

Hoplismenus impar. Type.—Pub. Mus., Quebec. Data not obtained.

Hoplismenus scutellatus. See *Ichneumon*.

Hoplismenus stygicus. Type.—Not located, probably returned to collector.

Hoplisus angustus. Type.—Male, yellow label 1688. 2nd Coll. Pub. Mus., Quebec.

Hoplocampa canadensis. See *Selandria*.

Ichneumon absconditus. Type.—Male, yellow label 1210. Mus. Pub. Instruction, Quebec. Right antenna broken, left fore wing missing, thorax crushed but complete, hind tarsi broken, 3 basal joints of right present.

Ichneumon adjunctus. Type.—Female, blue label 93, yellow label 1189? (or one hundred and eighty-nine). 2nd Coll. Pub. Mus., Quebec.

Ichneumon æqualis. Type.—Not in Pub. Mus., Quebec, unless under *Amblyteles nubivagus* Cress.

Ichneumon annulatus. Type.—Male, yellow label 211. 1st Coll. Pub. Mus., Quebec. Right antenna broken off at scape.

Ichneumon approximans. Type.—Male, old rose label 31, yellow label 1193. 2nd Coll. Pub. Mus., Quebec.

Ichneuemon aterrimus. Type.—Not in Quebec or Ottawa. Probably returned to collector.

Ichneumon bimaculatus. Type.—Male, blue label 380, yellow label 1580. 2nd Coll. Pub. Mus., Quebec. Right antenna, front legs, left middle leg and left hind wing missing.

Ichneumon bimembris. Type.—Female, yellow label 99. Pub. Mus., Quebec.

Ichneumon calcaratus. Type.—Not in Pub. Mus., Quebec, unless under *Hoplismenus morulus* Say.

Ichneumon caudatus. Type.—Female, yellow label 139. 2nd Coll. Pub. Mus., Quebec. Verdigris.

Ichneumon cervulus. Type.—Male, yellow label 134. 2nd Coll. Pub. Mus., Quebec.

Ichneumon cinctipes. Type.—Not in Pub. Mus., Quebec, unless under *I. navus*. One specimen female, yellow label 161. 1st Coll. Pub., Mus., Quebec.

Ichneumon cinctitarsis. Type.—Male, yellow label 112. Pub. Mus., Quebec. Right antenna missing.

Ichneumon citatus. Type.—Male, yellow label 162. 1st Coll. Pub. Mus., Quebec. Lacks right antenna.

Ichneumon citrinus. Type.—Female, Harrington Coll. Antennæ and wings on one side gone, abdomen broken off, mounted on label.

Ichneumon clapini. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon milvus*.

Ichneumon cressoni. Type.—Not in Pub. Mus., Quebec, unless under *I. velox* Cress.

Ichneumon decoratus. Type.—Male, yellow label 135. 2nd Coll. Pub. Mus., Quebec. Right antenna broken.

Ichneumon erythropygus. Type.—Not in Pub. Mus., Quebec, unless under *Platylabus thoracicus* Cress.

Ichneumon fortis. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon centrator* Say.

Incheumon hæsitans. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon funestus* Cress.

Ichneumon humilis. Type.—Female, yellow label 138.
2nd Coll. Pub. Mus., Quebec. Antennae gone.

Ichneumon lachrymans. Type.—Male, yellow label 136.
2nd Coll. Pub. Mus., Quebec.

Ichneumon lividulus. Type.—Female, yellow label 144.
2nd Coll. Pub. Mus., Quebec.

Ichneumon lobatus. Type.—Not in Pub. Mus., Quebec,
unless under *Ichneumon duplicatus* Say.

Ichneumon magdalensis. Type.—Not located.

Ichneumon marianapolitanensis. Type.—Not in Pub.
Mus., Quebec, unless under *Amblyteles rufizonatus* Cress.

Ichneumon mellicoxus. Type.—Not in Pub. Mus.,
Quebec, unless under *Ichneumon puerilis* Cress.

Ichneumon mucronatus. Type.—Male, yellow label 214.
1st Coll. Pub. Mus., Quebec. Antennae, left front wing, hind legs,
median tarsus on right leg, left anterior tibiae and tarsi missing.

Ichneumon nigripes. Type.—Male, yellow label 987. 2nd
Coll. Pub. Mus., Quebec. Antennae broken near middle.

Ichneumon nigrovariegatus. Type.—Female yellow label
137. 2nd Coll. Pub. Mus., Quebec. Right antenna except scape
gone, left antenna broken off near middle, abdomen glued on.

Ichneumon nitidus. Type.—Not in Pub. Mus., Quebec,
unless under *Amblyteles electus* Cress.

Ichneumon ontariensis. Type.—Male, yellow label 1191,
pink label 30. Pub. Mus., Quebec.

Ichneumon paradoxus. Type.—Not located.

Ichneumon pilosulus. Type.—Female, yellow label 168.
1st Coll. Pub. Mus., Quebec. Antennae broken (one at 4th joint
and one at middle) and left hind leg gone.

Ichneumon placidus. Type.—Male, yellow label 142. 2nd
Coll. Pub. Mus., Quebec.

Ichneumon pomilius. Type.—Male, yellow label 123.
2nd Coll. Pub. Mus., Quebec.

Ichneumon proximus. Type.—Female, yellow label 163.
2nd Coll. Pub. Mus., Quebec.

Ichneumon quadripunctatus. Type.—Not located. Prob-
ably overlooked in Harrington Coll.

Ichneumon saguenayensis. Type.—Not located.

Ichneumon scutellatus. Type.—Male, yellow label 167. 2nd Coll. Pub. Mus., Quebec. Right antenna and right hind tarsus gone.

Ichneumon similaris. Type.—Male, yellow label 113. 2nd Coll. Pub. Mus., Quebec.

Ichneumon stygicus. Type.—Yellow label 167. 1st Coll. Pub. Mus., Quebec.

Ichneumon trizonatus. Type.—Male, yellow label 118. 2nd Coll. Pub. Mus., Quebec.

Ichneumon ustus. Allotype.—Male, yellow label 510. 2nd Coll. Pub. Mus., Quebec.

Ichneumon vagans. Type.—Yellow label 170. 1st Coll. Pub. Mus., Quebec. Apex of right antenna gone.

Ichneumon vancouverensis. Type.—Ent. Branch, Dept. Agr., Ottawa.

Ichneumon varipes. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon w-album* Cress.

Ichneumon vesus. Type.—Male, yellow label 122. 2nd Coll. Pub. Mus., Quebec.

Ipchiaulax americanus. Type.—Female, yellow label 1566. 2nd Coll. Pub. Mus., Quebec. Left fore wing loose.

Ipchiaulax ornatus. Type.—Female, yellow label 542. 2nd Coll. Pub. Mus., Quebec.

Ischnus impressus. See *Phygadeuon*.

Ischnus lentus. Type.—Not in Pub. Mus. of Quebec unless under *Cryptus limatus* Cress.

Ischnus parvus. See *Hemiteles*.

Ischnus placidus. Type.—Not in Coll. Pub. Mus., Quebec, unless under *Phygadeuon rectus* Prov.

Ischnus pyriformis. See *Herpestomus*.

Ischnus ruficornis. See *Phygadeuon*.

Ischnus scutellatus. See *Platylabus*.

Ischnus variegatus. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon w-album* Cress.

Isostasius canadensis. Type.—Not located.

Joppa canadensis. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon insolens* Cress.

Labidia columbiana. Type.—Pin with yellow label 1152. 2nd Coll. Pub. Mus., Quebec. Specimen has been destroyed.

Lampronota albifacies. Type.—Yellow label 409. Name label *Lampronota pleuralis*. Cress. 2nd Coll. Pub. Mus., Quebec. Proved by Prov. catalogue.

Lampronota humeralis. Type.—Male, yellow label 417. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Lampronota marginata. Type.—Female, yellow label 954. 2nd Coll. Pub. Mus., Quebec.

Lampronota nigricornis. Type.—Female, yellow label 501. 1st Coll. Pub. Mus., Quebec. Lacks apical half of right antenna.

Lampronota nigripes. Type.—Not in Pub. Mus., Quebec. Probably returned to collector.

Lampronota rufipes. Type.—Provancher did not describe this as a new species. Two females, Pub. Mus., Quebec. One, yellow label 503, 1st Coll.; other, yellow label 532, 2nd Coll. Both under name label *Lampronota rufipes* Cress.

Larra minor. Type.—Male, blue label 77(s), yellow label 1430. 2nd Coll. Pub. Mus., Quebec.

Larra quebecensis. Type.—Not located.

Larra rufipes. Type.—Female, white label 99(s); yellow label 1715. 2nd Coll. Pub. Mus., Quebec.

Leptobates canadensis. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon signatus* Prov.

Leptothorax canadensis. Type.—Not located.

Limneria argentea. Type.—Female, yellow label 471. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tip, median and hind legs on left gone at coxæ.

Limneria basilaris. Type.—Male, yellow label 449. 2nd Coll. Pub. Mus., Quebec. Right antenna and left median leg missing.

Limneria brevicauda. Type.—Female, blue label 252 (apparently, blotted), yellow label 1221. 2nd Coll. Pub. Mus., Quebec. Left antenna gone at scape.

Limneria clavata. Type.—Female, yellow label 301. 2nd Coll. Pub. Mus., Quebec. Lacks left antenna at scape, right at apex, anterior and median legs on left.

(To be continued)

THE SECONDARY HOST OF MYZUS CERASI.

BY W. A. ROSS, DOMINION ENTOMOLOGICAL LABORATORY, VINELAND STATION, ONT.

On looking over some of the recent literature dealing with *Myzus cerasi*, the well known cherry aphid, we find that a difference of opinion exists among entomologists as to whether the species is migratory. Crosby (1) considers that the question is unsettled. Sanderson (2) and O'Kane (3) say that so far as known the cherry aphid has only one food plant. Gillette (4) states definitely that *M. cerasi* lacks the alternating food habit. On the other hand, Quaintance and Baker (5) claim that the species is migratory. How are we to account for these apparently conflicting statements? Is it possible that the species is partially monophagous and partially migratory? Our observations lead us to believe that it is. Apterous forms reside throughout the season on the primary host—cherry—and in addition alatae, produced during the summer, migrate to and establish colonies on a secondary host. In Ontario, according to our observations, the favourite alternate host is wild peppergrass, *Lepidium apetalum*. We have made several collections of *cerasi* from this weed and in migratory tests we have repeatedly been successful in transferring the louse from the cherry to the wild peppergrass. No doubt other crucifers serve as summer hosts. In our insectary experiments we have succeeded in establishing colonies of *cerasi* on *Capsella bursa-pastoris*, *Brassica arvensis*, and *Erysimum cheiranthoides*, but so far these results have not been verified in the field.

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2. Sanderson, E. D. Insect Pests of Farm, Garden and Orchard, p. 666.
3. O'Kane, W. C. Injurious Insects, p. 318.
4. Gillette, C. P. The Monthly Bulletin of State Commission of Horticulture, California, Vol. VI, No. 2, p. 63.
5. Quaintance and Baker. Farmers' Bulletin 804, U. S. Dept. of Agr., p. 24.

December, 1917

Index to Volume XLIX.

- Acantholyda ferruginea*, n. sp., 192.
Achrysocharella albitibiae, n. sp., 356.
Acroncosa, n. gen., 404.
 " *albiflavella*, n. sp., 405.
 " *similella*, n. sp., 405.
 Æshna, Red Deer species of, 99.
 Agonoderus indistinctus, 138.
Agrilus burkei, n. sp., 287.
 AINSLIE, C. N., article by, 93.
 ALEXANDER, C. P., articles by, 22, 61, 199.
 -*Allopora arizonica*, n. sp., 359.
 " *californica*, n. sp., 359.
 " *lutea*, 359.
 Amphibolips nigra, 348.
Amphrophora cicata, n. sp., 51.
 Anchonus duryi, 279.
Andricus castanopsidis, n. sp., 345.
 " *dugesi*, n. sp., 347.
 " *gemmiformis*, n. sp., 346.
 " *myrtifoliae*, n. sp., 346.
 Anthidium chubuti, 252.
 " *rubripes*, 252.
 Anthomyid, a new maritime, 148.
 Anthomyiidae, key to subfamilies of, 406.
Antocha monticola, n. sp., 23.
 Aphid genera, two new, 193.
 Aphididae, sensory structures in, 378.
 Apple leaf mites, 185.
 Apple maggot in British Columbia, 329.
Aræoncus patellatus, n. sp., 262.
 Argynnis, species in America of, 342.
 Arhipis lanieri, 239.
 Arrhenoplita ferruginea, 276.
 Arthmius gracilior, 139.
Aspidaphis, n. gen., 196.
 " *polygoni*, n. sp., 196.
Bactridium californicum, n. sp., 169.
 BAKER, A. C., articles by, 1, 378.
 BARNES, W., and McDUNNOUGH, J., articles by, 320, 371, 404.
 Bees, collecting, 113.
 Bees, some Euglossine, 144.
 Bees, some neotropical Megachilid, 252.
 Bembicinae of Nebraska, 285.
 BETHUNE, C. J. S., articles by, 37, 153.
 BEUTENMULLER, WM., article by, 345.
 Bicyrtes, Nebraska species of, 286.
 Bindweed prominent, 280.
Biocrypta magnolia, n. sp., 236.
 Biorhiza cæpulæformis, 348.
 BIRD, HENRY, article by, 121.
 Blaberus discoidalis, 295.
Blapstinus aciculus, n. sp., 275.
 BLATCHLEY, W. S., articles by, 137, 236, 272.
 BOOK NOTICES:
 Aldrich's Sarcophagidæ of N. America, 34.
 BARNES' and McDUNNOUGH's Checklist of N. American Lepidoptera, 219.
 CALVERT's Year of Costa Rica Natural History, 255.
 HEBARD's Blattidæ of N. America, 363.
 Proceedings of the Entomological Society of Nova Scotia, 292.
 VAN DUZEE's Checklist of N. American Hemiptera, 33.
 VIERECK's Hymenoptera of Connecticut, 362.
 WALSINGHAM's Lepidoptera—Heterocera, Vol. IV, Biologia Centrali-Americana, 31.
Brachyopa daeckei, n. sp., 360.
 " *diversa*, n. sp., 361.
 " *flavescens*, 362.
 " key to eastern species of, 360.
 " *media*, 362.
 BRITTAIN, W. H., articles by, 149, 186.
 Bumble-bees, cleaning, 291.
 Butterflies, two new Californian, 349.
 CAESAR, L., article by, 17.
Carebara californica, n. sp., 357.
 Caterpillars, death-feigning instinct of, 222.
 Cebrio mandibularis, 142.
Ceutorhynchus convexipennis, n. sp., 390.
Ceutorhynchus echinatus, n. sp., 386.
 " *invisus*, n. sp., 388.
 " *omissus*, n. sp., 388.
Chætocnema brunnescens, 275.
 Chalcid-fly, a new West Indian, 356.
Chalcoscirtus carbonarius, n. sp., 271.
 CHAMBERLIN, W. J., articles by, 321, 353.
Chionea gracilis, n. sp., 206.
 " *noveboracensis*, n. sp., 205.
 " *primitiva*, n. sp., 204.
 Chironomus decorus, habits and life-history of, 418.
 Chlorophorus annularis, 239.
 Cholos forbesii, 296.
 Chrysobothris chrysoela, 239.

- Cicadellidæ, additions to list of Mis-
 souri, 75.
 COCKERELL, T. D. A., articles by, 144,
 212, 252.
Cænagrion angulatum, 98.
 resolutum, 98.
 Coleoptera from drift-line of L. Michi-
 gan, 133.
 Coleoptera from west coast of Florida,
 137, 236.
 Coleoptera, new, 163, 385.
 Colopha, sensory structures in, 384.
Conotrachelus biscaynensis, n. sp., 385.
 " *maritimus*, n. sp., 278.
 " *obesus*, n. sp., 386.
Cordulia shurtleffi, 100.
Cornifrons pulveralis, 374.
 CRAMPTON, G. C., articles by, 213.
 Crane-flies, new nearctic, 22, 61, 199.
 CRIDDLE, N., article by, 77.
Cryphalus amabilis, n. sp., 321.
 " *grandis*, n. sp., 323.
Crypteria americana, n. sp., 29.
 Cuckoo-flies, death-feigning instinct of,
 222.
 Cutworm, a little known, 401.
 Cynipidæ, new, 345.
Cytorrhinus caricis, 250.

 Death-feigning instinct, the, 221.
Delphax maidis, synonymy of, 147.
Dendroctonus, Oregon species of, 323.
Dermestes elongatus, 141.
Dialyta flavitibia, 148.
Diasemia disputalis, n. sp., 373.
 " *elegantalis*, 373.
 DICKERSON, EDGAR L., WEISS, H. B.
 and, article by, 104.
Dicranomyia melleicauda, n. sp., 22.
Dicyphus luridus, n. sp., 218.
 " *prasinus*, n. sp., 218.
Diplostyla brevipes, n. sp., 267.
 " *inornata*, n. sp., 266.
 " *keenii*, n. sp., 267.
Disonychia abbreviata leptolineata, n.
 var., 143.
 DOD, F. H. W., articles by, 81, 240.
 Dolichopodidæ, new N. American
 species of, 337.
 Dragonflies of the Red Deer Dis-
 trict, 96.
 Dragonflies from Prince Edward
 Island, 117.
 Dragonflies, season irregularities in oc-
 currence of, 171.
Drepanaphis, sensory structures in,
 379.

Dryocoetes pseudotsugæ, 324.
Dryophanta floridensis, n. sp., 349.
 DUPOURTE, E. M., article by, 221.
Dysstroma, the genus, 64.
 " *citrata*, 65.
 " *mulleoata*, 69.
 " ab. *ochrofuscaria*,
 nov., 70.
Dysstroma mulleolata ab. *subumbrata*,
 nov., 70.

Eccoptogaster, Oregon species of, 325.
 Egasta, characters and synonymy of,
 372.
Elachertodomia, n. gen., 110.
Elater discoideus, 142.
 ELY, C. R., article by, 31.
 Embiidæ, antennæ of, 213.
Emersonopsis, n. gen., 110.
 EMERTON, J. H., articles by, 13, 261.
Enallagma calverti, 98.
 " *civile*, 118.
 " *cyathigerum*, 98.
 " *hageni*, 118.
Eriophyes malifolia, 189.
Erioptera cinereipleura n. sp., 200.
 " *noctivagus* n. sp., 200.
 Essigella, sensory structures in, 379.
Euchlæna albertanensis, n. sp., 351.
Eufriesia purpurata, 144.
Euglossa bicolor, 144.
 " *charapensis*, n. sp., 146.
 " *cyanura*, n. sp., 146.
 " *piliventris*, 144.
 " *variabilis*, 145.
 " *variabilis*, var. *hemichlora*, n.
 var., 146.
Eumerus strigatus, occurrence in Cana-
 da of, 190.
Euscelis ozarcensis, n. sp., 184.
Euxoa excellens, habits and life-history
 of, 401.
Exochomus marginipennis childreni,
 140.

 FALL, H. C., articles by, 163, 385.
 FELT, E. P., article by, 191.
 FENTON, F. A., article by, 309.
 FERRIS, G. F., article by, 375.
 FISHER, W. S., article by, 287.
 Flea-louse, Bay, in New Jersey 73.

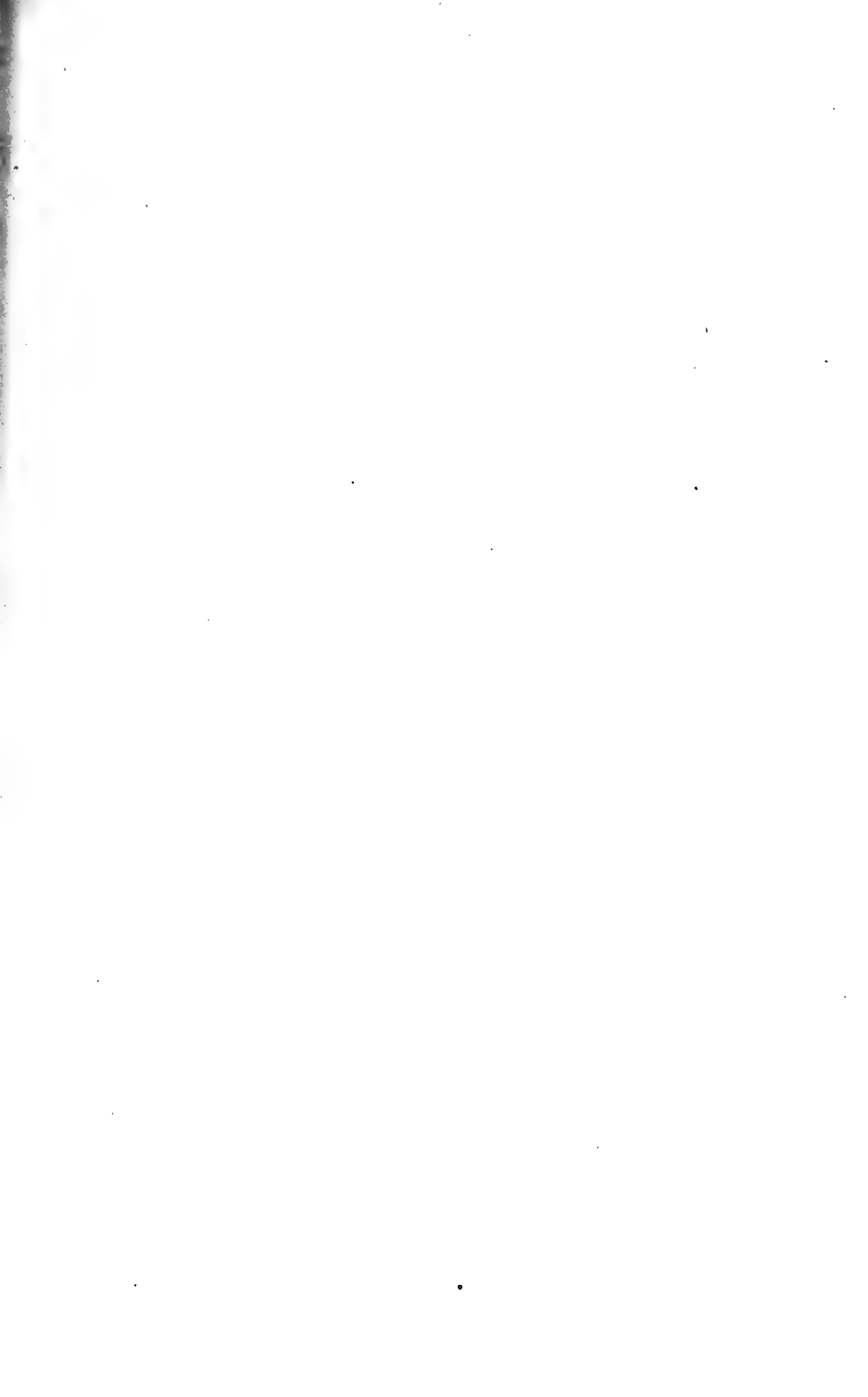
 GAHAN, A. B., and ROHWER, S. A.,
 articles by, 298, 331, 391, 427.
 Geometrid Notes, 64.
 GIBSON, A., articles by, 190, 401.
 GIBSON, E. H., articles by, 75, 183, 218.
 GILLETTE, C. P., article by, 193.

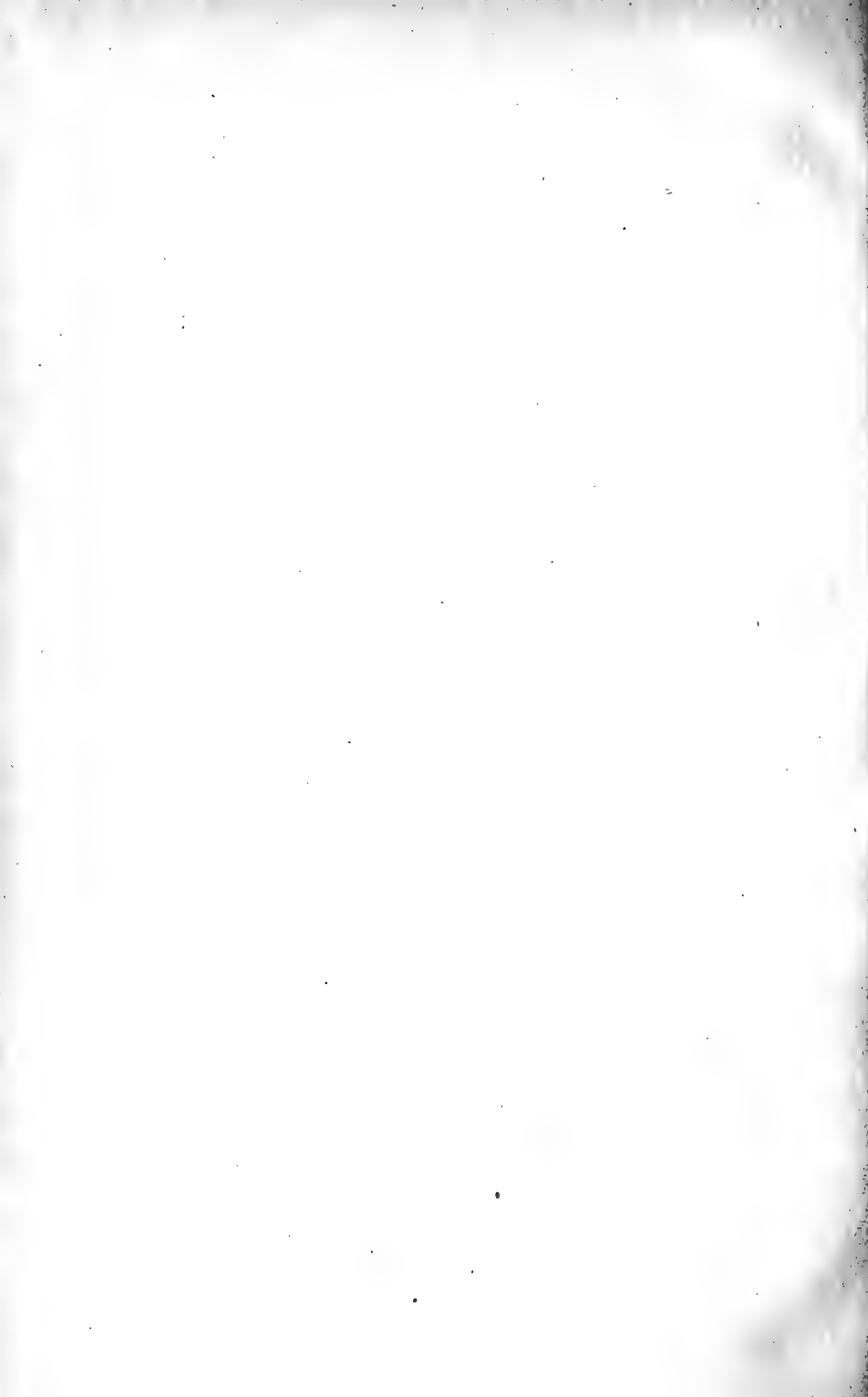
- GIRAULT, A. A., articles by, 110, 129, 178, 356.
Glaucopsyche behri australis, n. subsp., 350.
Glossura, n. subs. of *Euglossa*, 144.
Gnathotrichus, Oregon species of, 325.
Gongylidium curvitaris, n. sp., 262.
 macrochelis, n. sp., 263.
 unidentatum, n. sp., 264.
 Graphic presentations of entomological facts, 366.
 GRINNELL FORDYCE, article by, 349.
Grylloblattidae, antennae of, 213.
Gryllotalpa gryllotalpa, 294.
- Habrocytus arkansensis*, n. sp., 180.
 aulacis, n. sp., 150.
 borrowi, n. sp., 179.
 canadensis, n. sp., 181.
 dux, n. sp., 181.
 franciscanus, n. sp., 180.
Habrocytus, N. American species of, 178.
Habrocytus rhodobæini rosæ, n. var., 180.
Haliplus punctatus, 138.
Hallomenus binotatus, 358.
Halticus apterus, 249.
 Heath Collection of Lepidoptera, 81.
Helocharis maculicollis, 139.
Hemiptera Heteroptera, from drift-line of L. Michigan, 134.
Hemiptera Heteroptera, in ocean drift, 45.
 Hessian fly, influence of weather condition on prevalence of, 79.
Heterius exiguus, 167.
 loripes, 167.
 minimus, 167.
 strenuus, n. sp., 167.
 zelus, n. sp., 165.
Heterotoma merioptera, 250.
 HEWITT, C. G., articles by, 34, 289.
 HOLLINGER, A. H., articles by, 19, 281.
Hormaphis, sensory structures in, 384.
Hymenoptera, lectotypes of Provancher's species of, 298, 331, 391, 427.
Hypanthidium melanopterum, n. sp., 253.
Hypanthidium taboganum, n. sp., 252.
Hyperaspidius militaris, 140.
Hypotrichia spissipes, 239.
- Idiocerus fitchi*, life-history of, 149.
 Insect collections of Canada, 111, 153, 240.
- Insect drift of lake shores, 129.
 Insect immigration into New Jersey, 293.
 Insects in ocean drift, 45.
 Instinct, an interesting case of, 161.
Ips, Oregon species of, 328.
Ischyryus tripunctatus, n. sp., 238.
- Jassoidea, three new species from Missouri of, 183.
 JOHNSON, C. W., articles by, 148, 360.
- KENNEDY, C. H., article by, 229.
 KNIGHT, H. H., article by, 248.
- Lachnus*, sensory structures in, 379.
Lacon curtus, 142.
Lampyridæ, light-emission of, 53.
Lathrobium shermani, n. sp., 164.
 Leaf-hopper, black apple, life-history of, 149.
Lebia pulchella, 138.
Lecanium corni, distribution of, 310.
 " " food plants of, 310.
 " " history of, 309.
 " " life-history of, 311.
 " " status in New Jersey of, 119.
Lepidoptera, Heath Collection of, 77.
Lestes, species from Red Deer District, 97.
Lestes, species from Prince Edward Island, 118.
Leucorrhinia borealis, 102.
 " *glacialis*, 102.
 " *hudsonica*, 103, 119.
 " *intacta*, 103, 119.
 " *proxima*, 103.
- Libellula quadrimaculata*, 101, 119.
 LILJEBLAD, E., article by, 9.
Limnobia indigena-jacksoni, subsp. n., 199.
Limnophila cressoni, n. sp., 208.
 subaptera, n. sp., 207.
- Linyphia nearctica*, distribution of, 16.
Lophocarenum sculptum, n. sp., 261.
- MCDERMOTT, F. A., article by, 53.
 McDUNNOUGH, J., BARNES, W., and, articles by, 320, 371, 404.
 MACNAMARA, CHAS., article by, 39.
Macro-lepidoptera, the Dod Collection of, 240.
Macrosiphum, sensory structures in, 380.
Macrotheca interalbicalis, 374.
 MALLOCH, J. R., articles by, 225, 227, 352, 406.

- Mealy-bug, shell-back hickory, 19.
 Medonella minuta, 237.
 Melandryidæ, some new and known, 357.
 Melanophila notata, 239.
 Melanoplus atlanis, 78.
 " spretis, 77.
 MICKEL, CLARENCE E., article by, 285.
 Microneta clavata, n. sp., 265.
 " orcina, n. sp., 266.
 " pallida, n. sp., 265.
 Microsynamma bohemani, 248.
 Military service, officers and employees of Entomological Branch on, 72.
 Miridæ, European, in N. America, 248.
 Mite, apple leaf, 188.
 " silver-leaf, 185.
 Mole cricket, European, 294.
 Monædus guttatus, 141.
 Monoxia batisia, n. sp., 273.
 MOORE, C. A., article by, 33.
 Mordellistena exilis, n. sp., 10.
 " gigas, n. sp., 13.
 " insolita, n. sp., 11.
 " pulchra, n. sp., 12.
 " rufa, n. sp., 11.
 " rutila, n. sp., 10.
 " vera, n. sp., 11.
 " wolcottii, n. sp., 12.
 MUIR, F., article by, 147.
 Mycetochares puncticollis, n. sp., 276.
 Myzocallis, sensory structures in, 379.
 Myzus, California species of, 49.
 " cerasi, secondary host of, 434
 " godetiae, n. sp., 49.
 " sensory structures in, 380.
 NEEDHAM, J. G., article by, 129.
 Neobothynotus modestus, 251.
 Neoclytus simplarius, n. sp., 240.
 Neuroptera from drift-line of L. Michigan, 135.
 Noctuid, a new Canadian, 320.
 Nothosympycnus abbreviatus, n. sp., 341.
 " inornatus, n. sp., 340.
 Notomicrus nanulus, 138.
 OBITUARY NOTICES:
 REED, EDMUND BAYNES, 37.
 WILSON, TOM, 289
 Odonata of the Red Deer District, 96.
 " from Prince Edward Island, 117.
 Ophiogomphus severus, 98.
 Ormosia megacera, n. sp., 26.
 " mesocera, n. sp., 25.
 " nimbipennis, n. sp., 24.
 Orthocephalus mutabilis, 249.
 Otiorhynchus ovatus in British Columbia, 257.
 Papaipema eryngii, n. sp., 125.
 " new species and histories in, 121.
 Papaipema polymniæ, n. sp., 121.
 Parachrysocaris, occurrence in U. S. of, 129.
 Parachrysocaris semiflava, n. sp., 129.
 Paragrasshopper, 278.
 Pardosa mellakatta, n. sp., 268.
 " vancouveri, n. sp., 269.
 PARKER, R. R., article by, 157.
 PARSLEY, H. M., article by, 45.
 Peltodytes oppositus, 138.
 Pemphigus, sensory structures in, 384.
 Peregrinus maidis, synonymy of, 147.
 Phalonia spartinana, life-history notes on, 93.
 Phenacoccus pettiti, n. sp., 281.
 Philhydrus estriatus, n. sp., 139.
 Philodromus canadensis, n. sp., 270.
 " macrotarsus, n. sp., 271.
 Phloeosinus, Oregon species of, 353.
 Photinus consanguineus, light emission of, 61.
 Photinus scintillans, light emission of, 61.
 Photuris pennsylvanica, light emission of, 56.
 Phycitinae, New N. American, 404.
 Phyllocoptes schlectendali, 185.
 Phyllogaster cordyluroides, 227.
 " littoralis, n. sp., 228.
 " robustus, n. sp., 148.
 Phylloxera, sensory structures in, 384.
 Physokermes piceæ, distribution and history of, 317.
 Physokermes piceæ, life-history of, 318.
 " parasites of, 320.
 PING, CHI, article by, 418.
 Pithanus maerkelii, 251.
 Pityogenes carinulatus, 355.
 Pityophthorus, Oregon species of, 355.
 Plagiodera versicolora, life-history of, 104.
 Pleroneura borealis, n. sp., 191.
 Plum Curculio, in Ontario, 17.
 " means of control of, 18.
 Poecilochroa columbiana, n. sp., 269.
 Polyphylla gracilis, 239.
 Popular and practical entomology, 17, 39, 77, 113, 149, 185, 221, 257, 293, 329, 365, 401.
 Potato beetle, influence of snow on prevalence of, 79.

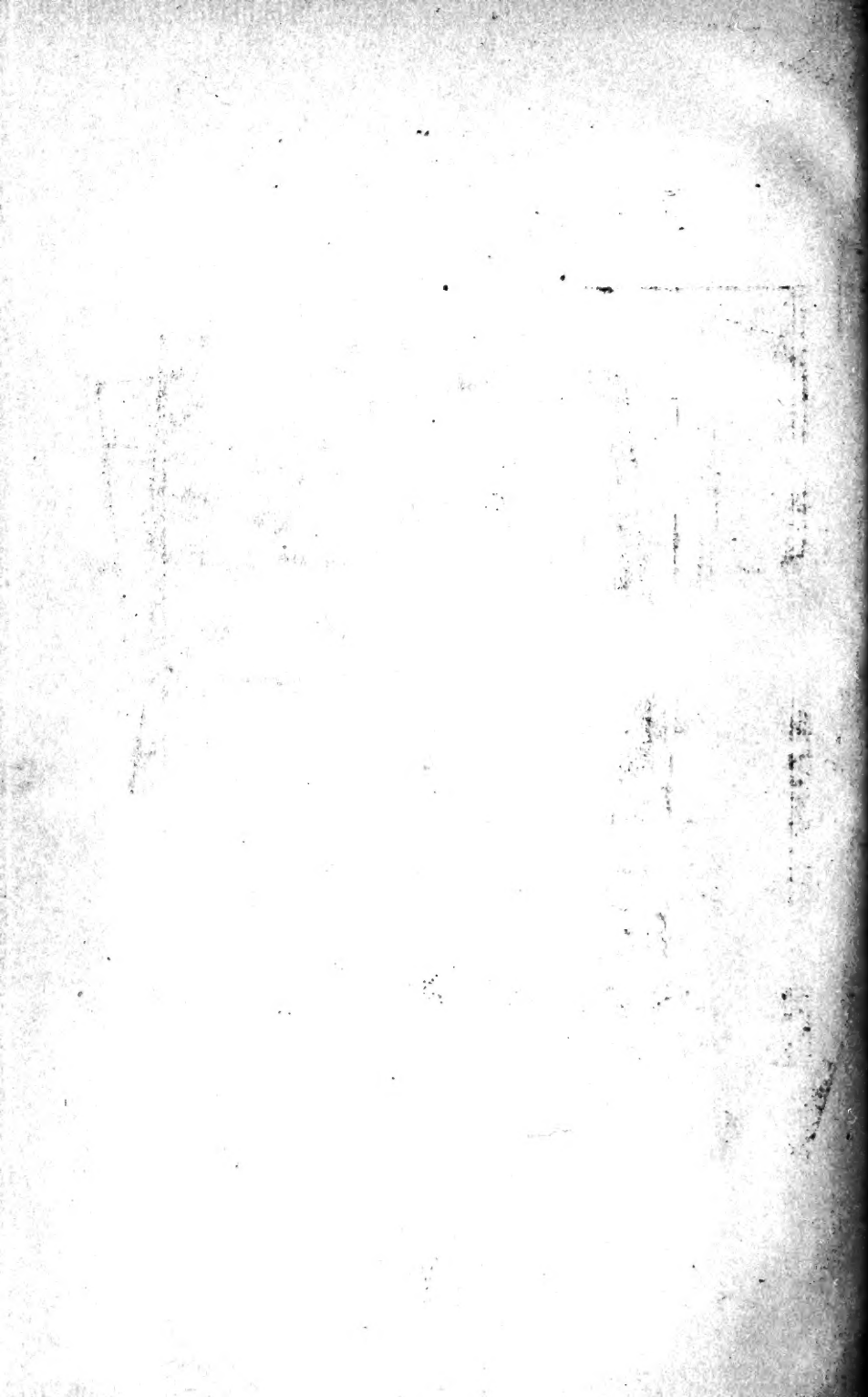
- Precipitation in relation to insect prevalence and distribution, 77.
 Prociphilus, sensory structures in, 382.
 PROVANCHER, insect collections of, 300.
 " life and work of, 299.
 Pseudococcus jessica, 21.
 Pseudohylesinus, Oregon species of, 353.
 Pterocomma, sensory structures in, 380.
Pyla fasciella, n. sp., 405.
 " *viridisuffusella*, n. sp., 406.
 Pyractomena angulata, light emission of, 60.
 Pyractomena borealis, light emission of, 53.
 Pyractomena lucifera, light emission of, 60.
 Pyractomena lucifera angustata, 142.
 Pyralid notes, 371.
 Pyrausta orphisalis, 374.
Rhabdomastix flava coloradensis, n. subsp., 28.
 Rhagoletis pomonella in British Columbia, 329.
Rhaphidolabis major, n. sp., 210.
 " *sessilis*, n. sp., 210.
Rhodophaea bicolorrella, n. sp., 404.
 Rhopalosiphum, sensory structures in, 382.
 ROHWER, S. A., GAHAN, A. B., and, articles by, 298, 331, 391, 427.
 ROSS, W. A., article by 434.
Saltusaphis americanus, n. sp., 3.
 " *ballii*, 4.
 " *elongatus*, n. sp., 4.
 " *flabellus* 6
 " key to species of, 2.
 " *scirpus* 6.
 " *virginicus*, n. sp., 7.
Sameodes adipaliodes, 372.
Saprinus carinifer, n. sp., 167.
 " *ciliatoides*, n. sp., 168.
 " *martini*, n. sp., 169.
Sarcophaga fulvipes dissidia, n. sp., 157.
 SAUNDERS, L. G., BRITAIN, W. H., and, article, by, 149.
 Sawflies, two new, 191.
 SCHAEFFER, CHAS., article by, 357.
 SHINJI, G. O., articles by, 49, 51.
 Schizura ipomeae, Louisiana records of, 280.
 Scolytid beetles of Oregon, annotated list of, 321, 353.
 Scraptia oculata, n. sp., 358.
Scymnus oculatus, n. sp., 140.
 SKINNER, HENRY, article by, 342.
 SLADEN, F. W. L., article by, 113.
 SMITH, E. J., article by, 291.
Somatochlora albicincta, 232.
 " *cingulata*, 235.
 " *elongata* 119.
 " *hudsonica*, 100, 232.
 " *septentrionalis*, 234.
 " *walkeri*, n. sp., 229.
Soronia brunnescens, n. sp., 238.
 Spiders, new Canadian, 261.
Sphindocis, n. gen., 170.
 " *denticollis*, n. sp., 171.
 Spiders, recent studies of Canadian, 13.
Stelis veraecrucis, n. sp., 254.
 Stephanitis pyrioides, 296.
 Stictiella, Nebraska species of, 285.
 STÖHR, L. M., article by, 161.
Stomacoccus, n. gen., 375.
 " *platani*, n. sp., 375.
 Strawberry root weevil in British Columbia, 257.
Strymon sylveinus desertorum, n. subsp., 349.
 Sunflower insects, 212.
 SWETT, L. W., articles by, 64, 351.
Sympetrum corruptum, 101, 417.
 " *costiferum*, 101, 413.
 " *illotum*, 417.
 " nymphs of N. American species of, 409.
Sympetrum obtusum, 119, 416.
 " *pallipes*, 414.
 " *rubicundulum*, 102, 119, 416.
Sympetrum semicinctum, 413.
 " *scoticum*, 102, 417.
 " *vicinum*, 413.
Sympycnus canadensis, n. sp., 339.
 " *caudatus*, n. sp., 338.
 " *fasciventris*, n. sp., 337.
 Symydobius, sensory structures in, 379.
Telephorus albolineatus, n. sp., 143.
Tenebrioides foveatus, n. sp., 142.
 Tetragonoderus fasciatus, 138.
Tetramerinx brevicornis, n. sp., 226.
 " key to species of, 225.
 Thecabius, sensory structures in, 384.
 Theridion zelotypum, distribution of, 14.
Thripsaphis, n. gen., 195.
 " *balli*, 194.
 " *producta*, n. sp., 196.
 " *verrucosa*, n. sp., 194.
 Tiger beetles, 77.
Tinobregmus moodii, n. sp., 183.
 Tipulidae, new nearctic, 22, 61, 199.

- Tomarus hirtellus, 140.
TREHERNE, R. C., articles by, 257, 329.
Tribalister striatellus, n. sp., 165.
Tricosiphum, sensory structures in, 380.
Tricyphona autumnalis, n. sp., 30.
 " *cervina*, n. sp., 62.
 " *glacialis*, n. sp., 63.
 " *degenerata*, n. sp., 209.
Trimicra angularis, 26.
Trioza alacris in New Jersey, 73.
Trirhabda canadensis, death-feigning instinct of, 224.
Tritona dissimilis, n. sp., 140.
Trypodendron, Oregon species of, 356.
Toxoptera, sensory structures in, 382.
TUCKER, E. S., article by, 280.
Tychius picirostris, death-feigning instinct of, 228.
Typhlocyba modesta, n. sp., 184.
VAN DUZEE, M. C., article by, 337.
WALKER, E. M., articles by, 117, 171, 255, 292, 362, 363, 409.
Wasps and bees, collecting, 113.
Wheat-stem-saw-fly, 78.
WEISS, H. B., articles by, 73, 104, 119, 293, 365.
WHITEHOUSE, F. C., article by, 96.
WINN, A. F., articles by, 111, 219.
Wolf Spider, on the portrait of a, 39.
Xylomoia chagnoni, n. sp., 320.
Zagloba bicolor, 237.
Zagymnus clerinus, 272.
Zonantes schwarzi, 277.









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